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# A SYNOPSIS OF SURGERY.

BY

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## P R E F A C E .

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For some years I have been in the habit of distributing amongst the members of my clinical class at St. Vincent's Hospital leaflets containing a synopsis of each lecture. It was done with a view to systematise my teaching, to lessen for the students the trouble of taking notes, and to save repetition by enabling me to make easy reference to subjects with which I had already dealt. These leaflets are now printed in a continuous form, together with an address which was introductory to the lectures in question.

The students attending St. Vincent's Hospital are divided into two classes—junior and senior. It was to initiate the former into the habit of looking, in the first instance, to patients rather than to books for the symptoms of disease that the notes of “cases illustrating the incidents of inflammation” were printed.

Of the desirability and feasibility of systematising clinical teaching, so as to render purely theoretical lectures unnecessary, I have no doubt. Of the shortcomings of my attempt to do so I am equally aware. The matter, however, has fared better at the hands of my colleagues, and its permanent success, as far as St. Vincent's Hospital is concerned, would, I think, be assured if the Licensing Bodies would recognise the sufficiency of such teaching.

A synopsis of a subject for school purposes is necessarily more or less a synopsis of the views of its recognised teachers. Foremost amongst these, in the subject of

surgery, I place Erichsen. Indeed, it seems to me he has so impressed himself on this generation that it is not possible to get far from him and teach surgery as students are expected to know it by the Examining Bodies. Amongst others to whom I am specially indebted are—Treves, Walsham, Morris, Holmes, and Cheyne; and in surgical pathology, Hamilton, Green, and Cohnheim.

The absence from these leaflets of details of operative procedure is due to the fact, that for the students of St. Vincent's Hospital my colleague, Mr. M'Ardle, dealt with this branch of the subject. Should he, as I hope he will, make public his work, it will be seen how justified is the omission in question.

R. F. TOBIN.

60 STEPHEN'S-GREEN, DUBLIN,  
*June, 1898.*





## SURGERY AS A PROFESSION.\*

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GENTLEMEN,—

“The profession which you and I have chosen, or which circumstances have prescribed for us, is a noble profession, and worthy the devotion of a lifetime.” These words of Watson’s have always moved me, and so I take them as the text for the Address which it is my duty to deliver to you to-day. They may be old-fashioned, these Introductory Addresses—but surely it is well that teacher and pupils as they travel onward should once in a way pause, and looking back on the road they have been traversing, lend themselves to such thoughts as the situation may call up.

The profession we have chosen is noble for reasons that apply to professions in general, and for others that are in a special manner its own. In all professions honour comes from the fact that remuneration cannot be graduated to the work done. For, while in occupations where the law of barter can have full force, there is between contracting parties a settlement so complete that no indebtedness remains on one side or the other, in professions no such settlement can be made, and therefore those who practise them become repositories of trust

\* An Address delivered in 1895

in an ennobling degree. Moreover, the goods, if I may use the expression, of some professions are so absolutely without price that it may be truly said of any man who properly dispenses them, that no matter what material wealth he may acquire, he leaves mankind his debtor. Hence it is that from the earliest times the fees given to professional men have been looked upon not as direct payments, but as "honoraria"—sums contributed by the well-to-do to enable the recipient to live suitably and follow his avocations amongst the rich and the poor alike. That this is still pretty well the view taken of our position by the public the following incident will illustrate:—Some years ago, when stationed in a country town in England, a subaltern of the regiment to which I then belonged entered the messroom one morning and accosted me with the remark—"What brutes some of you doctors are!" On asking for an explanation of this strange salutation, I learnt that when returning to barracks at a late hour the previous night, as he walked through the empty streets, his attention was attracted by a man knocking at a doctor's door. In response a window was opened, and an elderly gentleman inquired—"Who are you, and what do you want?" The man who had been knocking mentioned his name and the place he came from (about six miles distant), and added, "My wife is very ill; I want you to come and see her." "Have you brought the fee?" said the other. "No," was the answer, "but my wife will be dead before morning if you don't come." The shutting of the window was the only reply. "Now, wasn't that doctor a brute?" inquired my friend. Although not feeling very proud of my *confrere*, I asked, "What would *you* have taken to go six miles into the country at that hour of the night; you were probably not half as tired as that doctor; would you have done so for a guinea?" "I would not," was the answer. "You then look on the journey the doctor was called on to make as fully the equivalent of a guinea?" "I do; but it was a case of life and death." "If so, why didn't *you* give the man a guinea? He'd have given it to the doctor, who thereupon would have gone

to the patient." "But why should I," said my combatant critic, "have given a guinea?" "At least if you did not," I told him, "never again apply hard names to men not less generous than yourself;" and in that dilemma I left him. Nevertheless, put it how you may there does exist in the public mind this expectation of gratuitous work from us, and I point it out to you not as a thing to be cavilled at, but as one to be cherished—a splendid inheritance put together by the devotion and self-sacrifice of those who have gone before us.

The special reasons that render the profession of medicine honourable are so evident that I shall pass them by with this remark—A calling is honourable in proportion to its responsibilities; and whether, with Goethe, we look on the human body as the living, visible garment of God, or whether, viewing it from a materialistic standpoint, we look on it as an organised structure in which our pleasures and our pains have their beginning and their end—however we look upon it, the profession that dares to interfere with and to regulate its functions need not fear to have its claims to honour measured by its responsibilities.

In the next stage I am to indicate to you how you can to best advantage pursue your studies; and here it may not be out of place to remark how many there are who begin the study of medicine without likelihood of a profitable issue. A youth whose physical development made difficult for him the test of jumping, say, a three-foot hurdle, would think it cruel were he entered for pursuits requiring bodily strength and activity—yet, although the body and mind are in this respect comparable, how many begin with a light heart the severe mental gymnastics implied by the study of medicine, whose intellectual development is such that they with difficulty surmount the easy barrier of our entrance examination. It should not be possible for such men to register themselves as students. While they hamper the profession, and make slow its pace, their own lot is usually one of disappointment and failure.

The medical curriculum that you have to traverse after registration is known to most of you. It is a course very different from the one I went over—in what I may call the glacial epoch of medical education, so fast are we advancing. Now teaching is systematised, then there was no system. Medical food was then served out very much as a hen-wife throws food to chickens. Now a student is made sit down to a well-arranged *table d'hôte*, and so anxious are the waiters that he should dine well that they will not remove his plate till he has fully partaken of the course before him. This advance from confusion to system has been, I need not say, like other advances, one of development. And since in the most highly-developed animals we find processes, such as the appendix of the cæcum, which had, no doubt, a use in their time, but which now only furnish work for the surgeon, we need not be surprised if, in the system of teaching medicine, there survive methods useful once, but now only a hindrance to the exercise of its higher functions.

Let us consider the changes. They have been chiefly of two kinds. Firstly, the sciences that are the foundation of medicine— anatomy, physiology, physics, chemistry—have been handed over to specialists who devote their whole time to the teaching of them. Secondly, theoretical lectures, except in so far as they may be introductory to or explanatory of practical work, have been, with one remarkable exception, abolished. That these changes are for the best is acknowledged. What is the exception? Fifty theoretical lectures respectively in medicine and in surgery, delivered, not in the hospitals, but in schools of anatomy and physiology having no connection whatever with the hospitals, have survived the general collapse of purely theoretical lectures, and constitute what is called the systematic teaching of medicine and of surgery. These lectures not only survive, but, in this city, at least, they dominate the educational situation, and put clinical work in the shade.

I ask the senior students present is this not so? Have not

medicine and surgery for you an academic rather than a practical existence? Is it not a fact that attendance at hospital is bad and perfunctory, and that from an examination point of view it does not pay? that it is common for you to refuse the post of resident in a busy hospital because it interferes with reading? and that you can become prize-men in medicine and surgery without having ever seen a patient? This is not the way one learns other practical pursuits. Cricket is learned on the playground, and cooking in the kitchen; in all theory has no existence apart from practice. But in the study of medicine and surgery theory not only stands apart from these arts but it actually takes their names. Surgery in scholastic phraseology means the theory of surgery. A man says, for instance, "I passed in surgery" (meaning the healing art as taught in the lecture theatre), "but I failed in clinical surgery." Or, again, "Mr. Browne lectures on surgery, and Mr. Jones on *clinical* surgery." It does not however sound strange—not as if he spoke of *dissecting-room* anatomy or *kitchen* cookery. Why is this?

We shall find the causes first in the fact that the lectures and examinations of medicine and surgery are held in the schools; and secondly in this other fact, that it is much easier to examine a candidate in the theory of the healing art than in its practice. Why, of all the examinations a student has to pass only one is clinical; and, since the opportunities of testing a man's clinical proficiency in our art are not to be had at will on a given day, even this one examination is often practical but in form. A student, therefore, finding that theoretical knowledge is more easily attained, and is more effective for examination purposes than practical knowledge, naturally gives theory first place.

These considerations supply, I think, the pathology of this disorder, and indicate the following line of treatment:—Make the hospital authorities responsible both for the theoretical and practical teaching of medicine and surgery. Let the two courses extend concurrently over the three years of hospital attendance,

one illustrating the other ; and let the hospital teachers have a voice in the qualifying examinations of the students in their charge. Examinations, as we all know, govern the educational situation. Bodily attendance at instruction is enforced by roll-call, but mental attendance by properly-conducted examinations. They have a two-fold use—they compel the attention of a student to a particular course of study, and they gauge his knowledge. It is evident that medical examinations should be directed specially to the first of these objects since students are inclined to avoid hospital work. It is also evident that to do so they must, at least in part, be conducted by the person, or persons, in whose hands was the regulated course of study that preceded the examination, for such persons alone can have knowledge of the particular incidents constituting the education in question. Of course assessors from the Licensing Body, whose qualifications the student sought, should attend such examinations. It should, in fact, be a conjoint examination conducted in part by the Teaching and in part by the Licensing Body, and while it would be on the report of its own representative that the latter would grant its licence, it would have the satisfaction of knowing that such report had been drawn up after consultation with men who had had for years almost daily opportunities of testing the candidates' capabilities. There may be difficulties that I do not see in this scheme, but, if so, surely it does not pass the wit of man to devise some scheme that would have the desired effect.

The objections I have heard urged against the abolition of lectures on medicine and surgery in the schools are chiefly two—the first is, that teaching in the hospitals is not sufficiently full and systematic to warrant the change. But why it is not full and systematic ? Simply on account of these very lectures. Although they are only fifty in number respectively for medicine and for surgery, they are supposed to complete the education of the student in these most extensive subjects ; and so hospital teachers relieved from the responsibility of giving systematic

instruction tend "to walk the wards" with their pupils in a rambling and drifting fashion. The abolition of the one kind of teaching means the reformation of the other. It means a full course of teaching instead of a partial one; and a broader and better platform—the platform from which Graves gave his lectures—for the professors who at present fill, and most ably fill, the various chairs of medicine and of surgery.

The second objection is, that the cases in hospital do not cover the whole field of surgery and medicine. This argument, if sound, would hold against nearly every practical course, for how many courses are there of which every incident is illustrated practically? It is an argument that does not exist for whoever remembers that men learn the healing art solely with a view to practise it. In hospital wards our work is laid before us in proper portion; we meet cases just as they occur in life, and the rare cases that have for the ordinary practitioner a merely academic existence can be treated of academically just as well in the lecture theatre of the hospital as in any other theatre.

As we are living in a time when very great importance is attached to literary education, it may be well to remind you that the study of literature—even of medical literature—does not cultivate the whole plain of the intellect and that it leaves practically untouched that portion of it in which the physician must gather his fruits—I mean the field of observation. Education, as it is at present understood, helps us, amongst other things, to conceal our shortcomings. Perhaps it is on this account that men in a civilised country appear to the casual observer a very even lot. Some may be enabled by the gift of music, painting, or literary skill, to distinguish themselves amongst their fellows, but, as a rule, we live by appearances, and it is most difficult to demonstrate or ascertain what a man is made of—what is his intrinsic worth, and especially to what extent he possesses that quality, than which no

other makes him so useful to his fellow-man—I mean the power of original observation. It is otherwise amongst people for whom the problems of life are not made complex by civilisation. When it depends on a man's own unaided powers whether he shall die of hunger or cold, be devoured by wild beasts, or lose his way in the trackless wilderness, the question of what he is, as distinct from what he appears to be, is quickly answered. The man of appearances vanishes from the scene. We, therefore, find in uncivilised and nomadic tribes that not only does each individual possess quick perception, but that the degree in which he possesses this quality is well known to his fellows. For instance, if in some remote part of India or Africa you enter a village and ask for some one to help you in hunting big game, the man most suitable for your purpose is at once forthcoming. What he will do for you is amazing. An animal has been wounded, and it disappears in the jungle. He rushes forward and follows it, as if it were still in sight. You stick to him as best you can. When he pauses you ask him—"Are you sure we're right?" He perhaps only answers "See! See!" and starts on again. And he will, with marvellous precision, follow that wounded animal either till he overtakes it, or till it is evident that pursuit is hopeless. If questioned as to how he does it, he is at a loss to say. His methods are so ingrained in him that they belong to his instinct rather than his reason. Every up-turned particle of dust, every broken twig, every cropped blade of grass has appearances that tell him the exact moment when it acquired its characters. Looking at the distance between footprints, and noting an irregularity in one, he may remark the animal is lame, but it is going fast; and, later on, see, it halted here and looked round, and so on through details that would weary you. Suffice it to say that he can read from the surface of mother-earth all the incidents of a long chase as clearly as any of us may read the incidents of a hunt in a morning paper.

From our lives here civilisation has almost completely banished the necessity for observation. Our complex system requires a sub-division of labour; and each one gladly shifts from himself the trouble of judging and seeing. Moreover, education, as at present conducted, teaches us to see with the eyes of others rather than with our own. Consequently there is, coincident with the advance of culture, a general depreciation of acuteness of perception, and for many certain faculties have become so atrophied from want of use that were they suddenly shifted back into a primitive state, they would rank as imbeciles and speedily perish. I do not think that this is an exaggeration. For have we not reached a stage when, provided a man has sufficient observation to recognise his own hat and umbrella in his club, he can carry on very well. Some cannot pass even this low standard, and yet they prosper. But pray, Gentlemen, do not think that I want to depreciate civilisation unduly, or to throw in my lot with "narrow foreheads ignorant of our glorious gains." No; I am here rather to appeal to the broadest foreheads amongst you, and to ask you to think out for me the question I am submitting to you. I have not a word to say against the man who fails to recognise his own umbrella or knocker, and who has to ask a policeman the way at every turn, provided he does the work he is appointed to do efficiently; but I would ask you to note that the training in vogue has not developed his powers of observation, and has not educated him for a profession of which observation is the very essence.

Before I leave this important question of work in hospital there is one other consideration I would submit. You are acquainted with the saying of Carlyle, that "we must all toil or steal, however we name our stealing," but has it ever occurred to you that if you neglect your clinical studies, the stealing rather than the toiling will hereafter be forced upon you? In other occupations a man is saved from dishonesty by the ease with which his work can be appraised by the buyer; but a doctor has no such safety. If you idle as students,

you will almost be compelled to steal as practitioners. For what are you to do? You cannot confess your ignorance, you cannot go back to the wards, you cannot pursue clinical studies in your own homes; you are forced by the diploma in your hand to concur in the general assumption that you are acquainted, at least, with all ordinary forms of disease, and in the customary suit of solemn black, and with a grave deportment—which Sterne defines as a mysterious carriage of the body to cover defects of the mind—to go forward and act a lie. One man I know, who, looking back on neglected opportunities of clinical study, when face to face with critical cases in remote parts of the world, where consultation with others was impossible, found the strain of the situation almost too great for endurance, and many times exclaimed—"Would to God that I were a tradesman doing any honest work, rather than a charlatan responsible for the lives of my friends." Granted, then, that for you there is special force in the statement you must toil or steal, let me give you some suggestions that may make your toiling fruitful. From the outset cultivate the habit of seeing with your own eyes, and of making for yourself in simple words a definition of whatever new thing is presented to you. When asked a question don't begin to think, what am I expected to say? but give expression to what is in your mind. How can observation grow if you stifle your impressions? Don't lag at work assigned you because you don't feel that you are learning—the best progress is not marked by that sensation. Above all, despise not the every-day cases of the wards and of the dispensary—their commonness is their recommendation. If you mount to the top of your profession, you will do so by such cases. In place, however, of your seeming to be impressed with this plain truth, the conduct of many of you would lead to the supposition that you expect your practice hereafter to consist of rare cases and major operations, and that you will not be called on to render to your fellow-man the simple services demanded by his every-day ailments. Youth has had some

such dreams in every age. Do you remember a passage in the "Idylls of the King" in which Merlin, "the most famous man of all those times," tells how he reproved a knight for such purposeless aspirations—

"I once was looking for a magic weed  
And found a fair young squire who sat alone,  
Had carved himself a knightly shield of wood,  
And then was painting on it fancied arms,  
Azure, an Eagle rising or, the Sun  
In dexter chief; the scroll 'I follow fame.'  
And speaking not, but leaning over him,  
I took his brush and blotted out the bird,  
And made a Gardener putting in a graff,  
With this for motto 'Rather use than fame.'"

In making this motto yours pay special attention to two things—firstly, on every convenient occasion record your observations in writing; no matter how bald or inaccurate they may be, put them into words—there is no other exercise that will more surely clear away that haziness of mental vision so fatal to progress; secondly, miss no opportunity of attending *post-mortem* examinations—take with you your notes of the case, and compare the conclusions you came to with the real state of the case as revealed by the pathological appearances. It is only thus that you can gain knowledge that is reliable. Where *post-mortem* examinations are the exceptions and not the rule, the imagination of the physician becomes unduly developed. He seems to himself never to make mistakes, and so he starts and perpetuates false teaching indefinitely. The custom of the Army Medical School at Netley is one I would like to see existing in every hospital in the kingdom. Whenever a fatal case occurs the medical staff of the hospital assembles. The officer in charge of the case stands forward and reads its history, its symptoms, and its diagnosis. The pathologist then makes *his* examination. He demonstrates the condition of the different organs, sometimes to the confusion, sometimes to the satisfaction, *always to the improvement*, of those who saw the case

during life. Can you imagine anything more instructive than this putting side-by-side of things as they were said to be and things as they really were?—any greater check on incompetency, carelessness, or quackery, any greater safeguard for the helpless, anything more in the interests of the public at large? The peculiarity of the Netley custom is not in the method of the *post-mortem* examinations, for it is that which prevails in this and many other hospitals, but in the fact that it is extended to nearly every case that dies, be he officer or soldier. Public opinion in this country will not permit us to do likewise; such objection is the natural outcome of reverence for the dead; but when the public know that these examinations are conducted with all proper reverence and without mutilation, when they see the great and universal good that *must* result from them, they will not, I am sure, long stand in the way of permitting the dead to render this one last service to the living. In the meantime, since the opportunities for this particular kind of study are not as numerous as one could wish, their scarcity is all the more reason for your using with jealous care those that do occur.

You are joining the medical profession at a time when it is making great advances, and to some of you it may be given, not only to use for the benefit of suffering humanity the discoveries that already have been made, but to add to these discoveries, and so continue your usefulness to all time. It is not, however, to buoy you up with hopes of such a destiny that my words are directed. I want rather to warn you, lest, seized with what I may call the spirit of the age, you should mistake change and novelty for progress, and follow those who leave the beaten track just to advertise themselves by their departure. The pursuit of knowledge by men is like in many ways to the pursuit of a fox by dogs, and, as there is something to be learned from the straightforward running of good hounds, permit me to call your attention to a sight many of us are familiar with. The pack is spread out in the gorse, every nose upon the ground: you start, for a dog near you has given tongue, but the others

pay no heed. It is only "Babbler," who knows not a rabbit from a fox. Again the welcome sound, but it is answered only by the huntsman's whip—old "Ranter" did not know it was so near; but now another hound speaks, he has never done so at random or in error, and many heads are raised. He does so again, and those near him close in around. In a little time they, too, acknowledge the scent, the whole pack press forward, the chorus swells, they burst through the cover, they clear the fence, and are streaming across the plain in full pursuit of their quarry. Men are not as quick as dogs in their appreciation of one another, and we sometimes, therefore, listen to voices that are of no account, and are misled by others that should be silenced by the whip. Be careful then how you speak, and when there is question of novelty, to whom you listen. By all means make independent observations, and draw your own conclusions from every incident that comes under your notice; but while doing so be silent. Remember when life is the subject how complete should be the knowledge that dares to alter established modes of treatment; remember how many thousands of keen and thoughtful men have traversed the road that you are going; remember, finally, that knowledge is, in a measure, the residuum of failures which it is not permissible for you, as "heirs of all the ages," to repeat. If methods of treatment that strike your fancy are not recorded in the text-books believe rather that they have been tried and found faulty than that it has been reserved for you, in your first years, to discover them. At the same time work out your own lines with modesty, with energy, and with accuracy. Believe me, accuracy is the foundation of success, and the foundation of accuracy is method. It has been my good fortune to have had opportunities of watching the practice of very many of the most eminent surgeons of the present day, both at home and abroad, and I can tell you, without chance of error, that methodical accuracy is the salient feature of their work, and that on which their success depends. We, Irishmen, as a rule, are not methodical, we have minds above system and routine,

and a finical attention to details is distasteful to us ; nay, even in our minds, ere one thought is fully formed another puts it out. Is not this true ? Well, it is also true that unless you alter all this you will not be even ordinarily successful in the practice of surgery.

It is pleasant after this unpatriotic confession of weakness to turn to the other quality which should distinguish your work, for in *that* you will not be found wanting. It is as natural to Irishmen to be kind as it is to them to be unmethodical. If we take away with one hand we give with the other ; and as this is so, it is almost unnecessary to remind you how the helplessness of those we come across magnifies beyond conception the most trifling service. You will soon learn this, for gratitude disproportionate to what you may have done will meet you, even to embarrassment, at every turn. For us there is not unmixed sadness in the thought expressed by Mrs. Browning :—

“ How many desolate creatures on the earth  
Have learnt the simple dues of fellowship  
And social comfort in a hospital.”

Or, again, in her description of such a hapless one carried to a hospital after meeting with an accident, and who

“ Lay there stunned, half tranced,  
And wished at intervals of growing sense  
She might be sicker yet, if sickness made  
The world so marvellous kind, the air so hushed,  
And all her wake-time quiet as a dream.”

Gentlemen, “ the profession which you and I have chosen, or which circumstances have prescribed for us, is a noble profession, and worthy the devotion of a life-time.” I have been able to touch on only a few of the many thoughts that sentence calls up. Here, as in going round the wards, I can but indicate to you my view of the situation before us ; you must look into it for yourselves. Here, as there, I am comforted by the thought that, of whatever I submit to you, you can learn more than I

can teach you. I have addressed you as I have because I want each one of you to form for himself, at the outset of his career, some idea of how he can best educate himself as a physician and surgeon, and some idea also of what such a man should be. For me he is, when at his best, one of much knowledge, for whom abstract laws have been modified by experience of this perplexing and suffering life ; nearer to a great artist than to a great scientist—he has not taken his brain and put it, as has been said, “ in the crucible of science, but has put science in the crueible of his brain ” and got from it what wisdom it will yield. He has left his mark on science, but science has not left its mark on him. Through his eyes a boy’s soul, if I may so put it, looks out brightly on the world. He lives his own life—his hands are of all men’s “ quickest unto good.”

The time allotted me has expired. Yet, as one at parting holds the hand of a friend and repeats with emphasis whatever advice it is most important should be remembered, so do I, knowing myself, and knowing you, detain you while I repeat, again and again, that in surgery the foundation of suecess is accuracy ; while again I tell you that to gain this aceuracy you must do with method and with care the most trifling things, till you create a habit that will not fail you in moments of difficulty and exeitement. Daily, almost hourly, the science of our profession grows, and as it does so, it sends its roots deeper and deeper into details—details, each one of which is often of terrible moment. Attention to them is a question not of will, not of ability, *but of habit*. A little more or a little less of such attention will, in many cases, turn the balance one way or the other. A little less—what does it mean ? For you, it means failure instead of suecess ; for your patient, it means death instead of life ; for your patient’s friends, it means sorrow instead of joy.—“ Oh, that little more, and how much it is ; that little less, and what worlds away.”

Our profession may be likened to a tree, for it is at its root we must labour if we would have its branches grow. If the

work has charms of its own, it has also dangers. Eyes bent on the ground may lose sight of what is above; minds occupied with scientific investigations may come to believe in science to the exclusion of all other teaching; men permitted to check the progress of disease and to stay the hand of death may in their pride forget Him “by whom they live, move, and have their being.” We struggle to make knowledge, and in the dust we raise there are germs that threaten our most cherished beliefs with corruption. Is there no antiseptic that can purify this dust?—that can arrest this corruption? Yes, you will find one that will not fail in honest, straightforward work; you will find one in the example wrought for us in “loveliness of perfect deeds,” by the ladies\* who labour with us in this hospital; you will find one in every action of your lives if you reverently practise the profession you have chosen, with this for motto—“Rather use than fame.”

\* The Sisters of Charity.







# SURGERY.

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## WHAT SURGERY IS, AND HOW TO STUDY IT.

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SURGERY is that department of medicine which deals with such localised diseases as are within reach of direct medication or mechanical treatment.

In surgical ailments we see either the direct or remote effects of irritants on the body. Such as are the evident result of the application of an irritant are styled injuries; these are known as diseases in which the connection between cause and effect is obscure. In every surgical case is to be seen the damage done, or being done, by the irritant or irritants; the process by which the damage is being repaired, or, in cases where the irritant persists, the efforts of the body to accommodate itself to the irritant or to render it innocuous. These are the actions with which the surgeon has to deal, to forward or oppose, as the case may be, and between which, therefore, as an initial step, he must be able to distinguish. In any one case they may be proceeding simultaneously, but if, as is often done, an attempt be made so to study them, confusion will result. It will be found more profitable to take them seriatim, and to begin with the simplest cases—*i.e.*, those in which an inorganic irritant has done momentary violence to a part, and in which the resulting injury is being mended in the best and quickest

way. Amongst the properties of the body is one which enables it, within certain limits, to effect its own repairs. The performance of this function in a thoroughly efficient manner cannot be classed as a disease. It is one that is commonly called "healthy," and that belongs rather to physiology than to pathology. It, therefore, behoves the student to study it at the outset, and to fix clearly in his mind its various methods and stages, so that he may be able to recognise it, and define all departures from it. He can best do this by observing and carefully recording cases of aseptic wounds and injuries running a healthy course to recovery.

When by this means he has stamped on his mind what may be called the physiological process of repair he should pass to unhealthy wounds, and note their behaviour and the disturbances they excite. These cases will bring before him the incidents of inflammation, and so his knowledge of this important process will be founded on his own observation. It is truer, perhaps, of the study of medicine than of that of any other science, that "particular observation should precede general ideas;" for in no other science is the cultivation of the powers of observation of such vital importance.

The science of medicine is made up of WHAT MAY BE LEARNED OF IT IN THE PATHOLOGICAL LABORATORY, and WHAT MAY BE LEARNED OF IT IN THE HOSPITAL. The latter study is our special work, but, before proceeding to it, it may be well to make a brief summary of some laboratory observations bearing on the first principles of our subject.

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# REPAIR AND INFLAMMATION; WHAT CAN BE LEARNED OF THEM IN THE LABORATORY.

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## WHAT IS MEANT BY "AN IRRITANT."

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IN order to understand what is here meant by an irritant, it is necessary to bear in mind that a living body—whether that term is applied to such a complex organism as man or to the minutest cell—is always undergoing some change. It is in a constant state of trying to accommodate itself to the ever-varying incidents of existence, or, to put it differently, the ever-varying incidents of existence are forever exciting responses in it. When the incident is one that calls forth a healthful discharge of function, it is called a stimulus. The stimulus, however, becomes an *irritant* when the actions excited are excessive or faulty in any way. An irritant, therefore, is anything that excites unhealthy action in a part. It owes its name not to what it is, but to what it does, and, since organisms vary greatly in the way in which they are influenced by incidents, it follows that what may be a stimulus to one may be an irritant to another and *vice versa*.

Irritants are classified as *mechanical*, such as a blow, an incision; *thermal*, such as heat, cold, and electricity; *chemical*, such as acids and alkalis; *organic*, such as the various germs and parasites that cause disease.

## EFFECTS OF INJURY ON THE BLOOD-VESSELS AND CIRCULATION.

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When an irritant is applied to a living tissue, the transparency of which permits of microscopical examination (such tissues as the web of a frog's foot, the wing of a bat, the mesentery of a rabbit), the following changes in its vascular system are observed :—

1st. *Hyperæmia ending in Stasis*.—There is in the part affected by the irritant a widening of the vessels, preceded, in some cases, by a momentary contraction, and an increased rapidity in the circulation of the blood through them. Sooner or later, however, this flow is seen to abate, and the stream grows slower and slower, till, finally, a too and fro oscillation of the current occurs, ending in “stasis,” or stagnation.

2nd. *Migration of Blood Cells*.—While the foregoing changes in the flow of the blood stream are taking place, an alteration in the behaviour of the blood cells is also noticed. The red corpuscles in the axial current show a tendency to stick together, while the white corpuscles may be seen falling out into the peripheral current, and then adhering to the walls of the vessels through which they finally transude. In cases where there is much irritation, the hæmatoblasts and the red corpuscles also transude, forced out by intravascular pressure.

3rd. *Liquid Exudation*.—Coincident, and under the same pressure, there is an exudation of liquid into the tissues. This liquid is almost identical with the plasma of the blood, and is coagulable owing to its containing a large proportion of fibrinogen, and white corpuscles, which, on dying, yield fibrin-ferment, the other element necessary for the formation of fibrin.

To the student who keeps in mind the ordinary process of nutrition, these changes will appear as little more than an exaggeration of that process. An increased flow of blood,





migration of cells, fluid exudation, are all incidents of health. In the excess of action lies the chief difference. If the irritant be now withdrawn, and the tissues have not been much injured, the foregoing incidents will return on their steps and bring about resolution. The liquid exudation and the cells will find their way back to the circulation through the lymphatics and the veins, and the blood current, after a few preliminary oscillations, will resume its flow. If, on the other hand, the irritant is continued, a further important change will occur. The stagnant blood and the liquid exudation will coagulate in the tissues, which have been more or less devitalised by the injury, as they would outside the body, and the coagulum as soon as formed will contract, entangling the migrated leucocytes, and squeezing the serum from out its meshes. This compound of fibrin and leucocytes is spoken of as *plastic lymph* and *inflammatory lymph*, and is the same as that which may be seen glazing the surface of long exposed wounds; while the serum may, at the same time, be seen standing as beads on, or flowing down, the glazed surface. When the wound is closed the serum will, unless there is proper drainage, collect in any cavity that may be left. In subcutaneous wounds, what is not taken up by the lymphatics collects in the spaces natural to the part, and gives rise to œdema.

*The effects of injury on the tissues in general* is to lower their vitality. During health there is, so to speak, an interchange of vitality between the tissues and the blood circulating through them. They are interdependent. This vital action of the tissues is impaired or destroyed by an injury, and, in proportion as they lack vitality, they act on the blood as would dead matter, causing it to coagulate. Another change noticeable in injured tissues is an increased tendency to proliferation in their cells. They enlarge, change shape, and form new cells by the enlargement and sub-division of their nuclei and protoplasm.

It is probable, however, that only cells to which the incident

causing the injury has been a stimulant rather than an irritant. show this activity.

Of the foregoing incidents, commonly called the early phenomena of inflammation, the migration and subsequent behaviour of the leucocytes is the most interesting and important, although one cannot fully appreciate the full meaning of their action until the whole process of inflammation has been studied.

What is it that they do? On a part being injured they may be seen leaving the vessels as already described, and crowding to the inflamed area, at times in such numbers as to conceal from view the normal structures. They make their exit partly in consequence of intravascular pressure and increased porosity in the walls of the vessels, partly by amœboid movements, and partly influenced by various chemical substances present in the inflamed parts. This attractive action of chemical substances on mobile cells is called *positive chemiotaxis*.

Arrived on the scene of action, the leucocytes—or phagocytes, as they are called while performing their present functions—seize on any invading organism that may be present, and on portions of tissue dead or irreparably injured, and, taking them into their substance, digest them. They act as an army of defence and as scavengers. Their work done, they return to the circulation through the lymphatics, or are themselves absorbed by other phagocytes derived from the original tissues. This process has been styled *phagocytosis* by Metchnikoff, who first described it, and who sees in it the essence of inflammation. He says, “The essential and primordial element of a typical inflammation consists in a reaction of phagocytes against a noxious agent.”





## BACTERIOLOGY.

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BACTERIOLOGY is a study of the minute germs which are now recognised as playing an important part in the production of disease. In the laboratory they are studied and classified according to their shape and arrangement when observed under the microscope, their manner of growth on culture media, and their effects on inoculation into animals. They are styled organic irritants, and are ranked with vegetable bodies of the order schizomycetes, or fission fungi. They multiply chiefly by fission. After elongation of the organism, a line of cleavage shows itself, grows broad, and a complete separation into two new organisms follows. A few varieties grow from spores. For instance, in the bacillus of anthrax this may be seen. In the protoplasm of the parent cell a little clear spot shows itself, and round this a capsule forms, the protoplasm then gradually disappears and a spore is left. Spores resemble ordinary seeds, inasmuch as they develop into organisms similar to those from which they spring, whereas, when an organism multiplies by fission, it goes on direct to its complete shape. They are with difficulty killed. They defy boiling, freezing, and our usual antiseptics. A prolonged dry heat of  $260^{\circ}$  F. is necessary for their destruction. It is lucky, therefore, that they constitute a rare form of propagation.

The chief classes into which "fission fungi" are divided are—*Micrococci*: minute spheres, which may be single, or double (diplococci), or in chains (streptococci), or in clusters (staphylococci). *Bacteria*: short rods, often oval, their length less than twice their breadth. *Bacilli*: little cylinders. *Spirilla*: spiral threads.

Albumen, either in its raw state or in the form of peptone, seems to be the material upon which schizomycetes flourish best. The medium should be neutral, or inclined to the alkaline side. They require an abundant supply of water. They are killed by a temperature below  $32^{\circ}$  and above  $140^{\circ}$  F., and by the usual antiseptics when in strong solution. Bright sunlight exercises a retarding, if not a destructive, influence on most of them. Many of them are motile, and their movements would appear to be purposive in character. They seem to act on organisms with which they come into contact by the chemical substances they create.

They are classified for clinical purposes as non-pathogenic and pathogenic. The *non-pathogenic* are also distinguished by the adjectives, non-parasitic, septic, putrefactive, and by the general term, saprophytes. They cannot survive in living tissues, and by their growth and multiplication in dead animal matter they cause a fermentation of the albuminoids, or, in a word, putrefaction. In doing so they produce certain alkaloids of a highly poisonous nature, called ptomaines. It used to be said that these organisms were all of one particular kind—"bacterium termo"—but it is now known that this form is only a stage in the life of several different organisms, and that there are many kinds of saprophytes, and that some go through many forms.

The process of putrefaction, or sepsis, requires the following conditions, of which the first and last sometimes, and the others always, are present in the living body:—

1. Dead animal matter, such as stagnant blood and serum, dead tissue, pus, and urine.
2. Oxygen.
3. Water.
4. A suitable temperature.
5. Saprophytes.

Saprophytes are very plentiful in ordinary water. They are less so in the air unless the sanitation is bad. They grow freely in serum, blood, and pus, when diluted with water; but these substances undiluted are not highly putrescible.

*Pathogenic organisms*, also styled parasitic and infective, can





live and multiply and disseminate themselves in the living body. Some few of them, such as bacillus of leprosy, refuse to grow on anything but the living animal body. They are met with in all forms, but chiefly in the shape of micrococci and bacilli. That a particular organism is the cause of a particular disease is taken as proved. 1st. When it is always present in cases of the disease. 2nd. When it is capable of cultivation outside the body. 3rd. When the disease is capable of production by inoculation with the pure cultivation. 4th. When the same organism is capable of demonstration in the disease thus produced. The number of diseases so proved to be due to particular organisms is every day increasing. That the pathogenic power of such organisms lies partly at least in the chemical substances they create seems indicated by the fact that the injection of a culture of pathogenic organisms, from which the organism itself has been excluded, is in many instances followed by typical symptoms of the disease to which the organism belongs.

The organisms that cause infective inflammations can enter the body only through some breach in the skin or mucous membrane. The breach is usually external, and at or adjoining the part attacked; but it may be at some spot in the lining membrane of the lungs or alimentary canal. Once entered they may spread by continuity of tissue, by the lymphatics and by the blood way. They naturally select the path of least resistance, and are properly said to disseminate disease, whereas the lesions to which non-pathogenic organisms give rise are better described as being diffused. Their progress depends on conditions which may be classed as *those on the side of the germs* and *those on the side of the soil*. The former are four—1st. The number of germs. "Victory is on the side of big battalions." 2nd. Their virulence. 3rd. Concurrent growth with other bacteria—for instance, putrefactive bacteria favour the growth of pyogenic cocci, whereas crysipelas cocci prevent the growth of anthrax bacilli. 4th. Local and seasonal conditions. As place and season have such an effect on vegetation generally,

it is probable that they have some influence on the fungi of disease. *Conditions on the side of the soil are three*—1st. A stationary soil seems necessary for most pathogenic organisms; they do not grow well in the blood stream. 2nd. The predisposition of tissues or of the blood must, in many cases, be increased by local or general depression of vitality, such as is induced by injury in the one case, and unsanitary surroundings in the other, before particular organisms can cause disease. 3rd. The seat of inoculation and the anatomical arrangement of a part are important.

*Connection between Putrefaction and Infective Inflammation.*—Although the pathogenic organisms that cause infective inflammations belong to a different class from the putrefactive, there is still companionship and, some maintain, relationship between them. Laboratory and clinical observation both show that the infective process, as a rule, springs out of the putrefactive. There are those who say that putrefactive organisms may in unhealthy wounds undergo a change rendering them capable of invading living tissues, and, in fact, constituting them pathogenic organisms. The other idea admits no such change as possible, but says that in septic exudations pathogenic organisms find a favourable soil—a first entrenchment—in which they gain strength prior to invasion; and further, that a way for them is prepared by the septic discharges, irritating and thereby lessening the vitality of the tissues in their neighbourhood—for it is commonly observed throughout the animal and vegetable kingdoms that weak parts are invaded by parasitic fungi.

The following experiments by Koch are interesting and instructive:—

He injected five minims of putrid fluid under the skin of a house-mouse. The animal, invariably, at once became restless, ceased eating, and died in from 4 to 8 hours, the time varying with the size of the dose. No pathological change was found in the body, and the blood inoculated on healthy animals produced no infection. It was evidently dead from the injection





of a poisonous alkaloid. Into other mice he injected only one or, at most, two drops of the same fluid. Some remained unaffected, but about one-third of them sickened after twenty-four hours and died within forty to sixty hours after inoculation. Swelling of the spleen was the chief *post mortem* appearance. In the blood were found small bacilli in large numbers, most white corpuscles containing one or many of them. Now if with the point of a scalpel which had touched any part of the subcutaneous tissue of a mouse which had died in this way he scratched even the ear of a healthy animal he found it was sufficient to cause death with similar symptoms, and that the experiment could be indefinitely repeated. He further found that some animals are immune as regards this disease—viz., field-mice and Guinea pigs—and that the fungi which cause the septicæmia of one animal differ from those which occur in that of another.

The difference between poisoning by the products of decomposition and the establishment of a true infective process is well indicated by the foregoing experiments. In the second lot of experiments when small quantities of putrid matter were injected there was not sufficient chemical poison to do harm, so only such injections as happened to contain pathogenic organisms, for which the host had an affinity, caused a disturbance. That these organisms found in the body of the mouse a congenial soil is shown by their virulence in the final experiments.

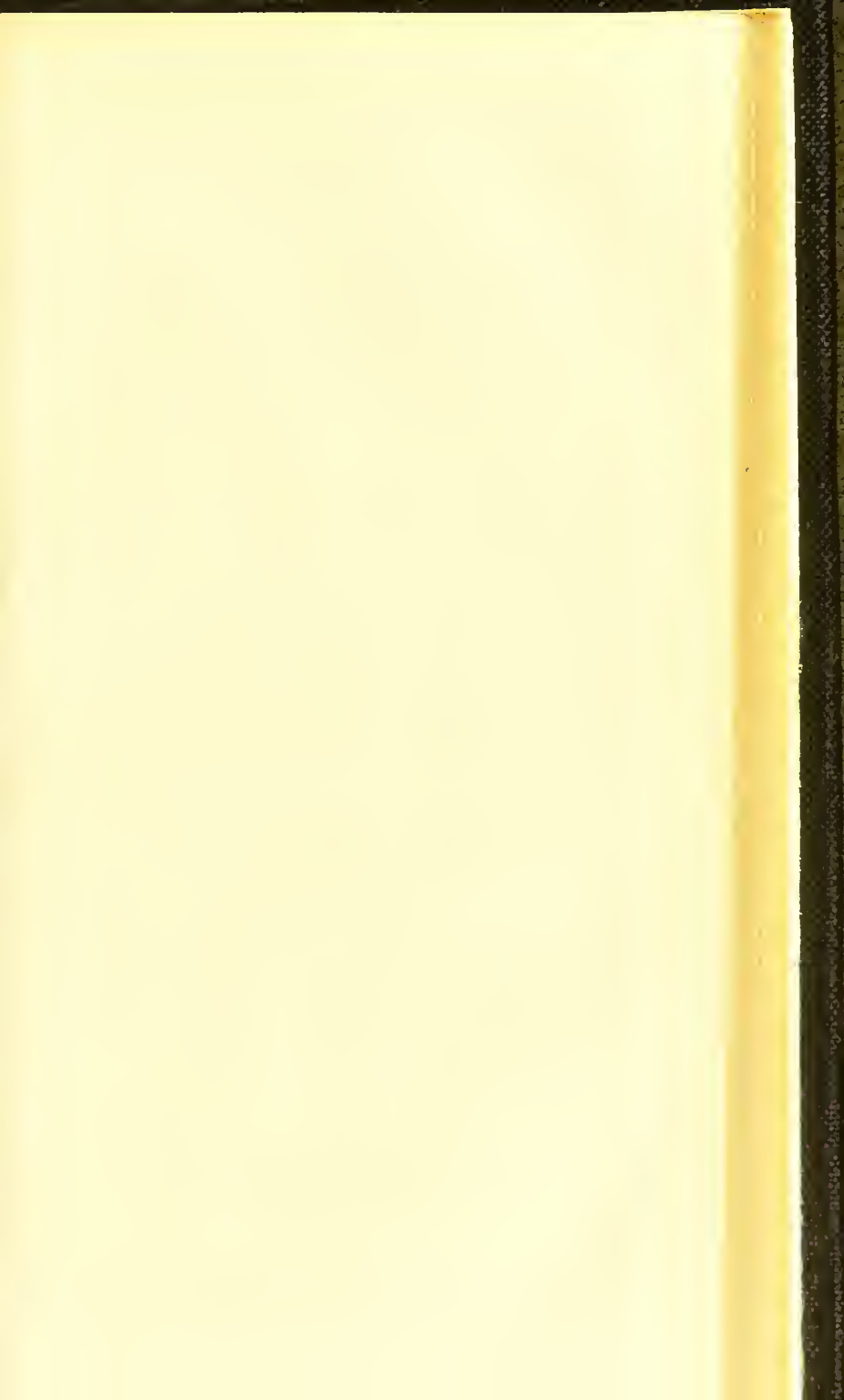
*Immunity.*—It has long been observed that different persons enjoy different degrees of immunity from disease; that in certain diseases one attack gives immunity from another; and that certain species of animals are protected naturally from diseases which others of a nearly allied type readily contract. Experimental research has thrown some light on these problems.

*Vaccination with the Microbe.*—Pasteur has shown that various pathogenic organisms become attenuated when grown out of their natural habit, and that in that condition, they, on inocula-

tion, excite little or no disturbance in the host, and still some change that acts as a protective.

*Chemical Vaccination.*—The chemical products elaborated by the microbe have also been employed to give immunity. In this instance, it has been found that the products of the tubercle bacillus will, if injected repeatedly and in increasing doses, produce a tolerance of that toxine, so that what would otherwise be a fatal dose can be borne with impunity. Further, that the serum of an animal so treated is an antitoxine. It will confer immunity on being injected into the circulation of a fresh host, and seems in some instances to be even curative of the disease when established. The milk of animals immunised as above is also rich in antitoxine.

In what does immunity consist? This question is not fully answered. There is the *humoural* and the *cellular* view. According to the former the immunising influence lies in the humours of the body; according to the latter the cells do the work. Metchnikoff, the originator of the cellular theory, maintains that immunity depends on a quality sometimes adherent to cells, but not to humours. It is impressed by vaccination on the phagocytes, and at others impressed by vaccination on the phagocytes, and which causes them to approach and seize upon invading pathogenic organisms. Phagocytes are seen at one time to be attracted by certain chemical substances (positive chemiotaxis), at others repelled by them (negative chemiotaxis). When they are attracted by the poisonous products secreted by the microbes of a given disease, immunity to that disease exists; when they are repelled, the microbes have it all their own way, and the disease prevails. But chemiotaxis is not immutable. A negative may be transformed into a positive chemiotactic state. Such obtains in acquired immunity. The cells which, in the unvaccinated animal, may have let the invading microbes pass, in the vaccinated take them up readily.





## REPAIR AND INFLAMMATION ; WHAT CAN BE LEARNED OF THEM IN THE HOSPITAL.

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THE processes of repair and inflammation are best studied by observing the changes occurring in classified cases of injury. For our present purpose, after dealing with the cardinal signs of inflammation, which it would be needless to illustrate with cases, as they have probably come within the personal experience of each of us, we shall divide cases of injury lately met with in the wards into two classes. Class I.—Cases in which an inorganic irritant has done momentary violence to a part, and in which the resulting injury is being mended in the best and quickest way. Class II.—Cases in which organic irritants, having found their way into a wound, are growing and multiplying there, and in which the body is making efforts, more or less successful, to render them innocuous, or to accommodate itself to them. This class will be subdivided into two sections. Section “A,” cases in which the irritants are non-pathogenic organisms. Section “B,” cases in which the irritants are pathogenic organisms.

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### LOCAL AND CONSTITUTIONAL SIGNS OF INFLAMMATION.

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The local signs of inflammation, commonly called the “cardinal signs,” are—Redness, swelling, heat, pain and modification of function. In order to understand how these changes may result

from an injury to living tissue, it is necessary to keep in mind the disturbances, as observed in the laboratory, which occur in the vascular system on the application of an irritant (page 6).

1st. *Redness*.—It is due to the increased amount of blood in the vessels of the part, and may vary from a bright scarlet to a dull purple colour, depending on whether the circulation is rapid or approaching stagnation. In every case it disappears on pressure and returns in proportion to the quickness of the local circulation. Discolouration due to blood not in the vessels—i.e., blood that has been effused—is unaffected by pressure.

2nd. *Swelling*.—This is due to the dilatation of the vessels of the part, and the exudation from them. Its degree is influenced by the character, loose or dense, of the affected textures.

3rd. *Heat*.—The temperature of the affected part is increased owing to increased afflux of heated blood. It is not greater than that of the blood going to the part, and is dependent only indirectly on the local nutritive changes.

4th. *Pain*.—Pain is due to the direct action on the nerves of the original irritant (instance, the pain that occurs and continues after a nerve has been divided), and to the pressure resulting from exudation and from dilatation of the vessels. Where due solely to the latter cause it is proportioned to the tension.

5th. *Modification of Function*.—By this is meant that the affected part fulfills its functions inefficiently, in consequence of the alteration of its tissues, and the change in the quantity and characters of the blood going to it.

The *general or constitutional* signs of inflammation are secondary to the local. They make the condition known as fever, and the essential of this condition is elevation of temperature. It is due to the entrance into the blood of a material produced at, or starting from, the seat of injury. This in simple traumatic fever is probably fibrin ferment, yielded up by disintegrated white corpuscles. In septic and infective cases there are, in addition, other pyrogenic substances resulting from putrefactive or pathogenic changes in the wounds or from pathogenic organisms





multiplying in the blood. Whether these noxious materials act directly on the tissues of the body, or indirectly, by disturbing a supposed heat-controlling centre in the medulla, is uncertain. The result, anyhow, is increased tissue-change in the body generally, and the production of heat. This increased combustion will explain most of the general symptoms of inflammation—viz., flushed face, rapid pulse, emaciation, loss of strength, scanty high-coloured urine, thirst, dryness of skin, dryness of the mucous lining, shown by dry tongue, sordes, constipation. In fact, one will not be surprised at the derangement of any organ when it is remembered that there is circulating through it blood over-heated and laden with the products of combustion, or, in other words, with the *debris* of disintegrated tissue.

### ASEPTIC CASES AND THE PROCESS OF REPAIR.

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Cases in which an inorganic irritant has done momentary violence to a part, and in which the resulting injury is being mended in the best and quickest way.

#### CASE No. I.—Subcutaneous Injury.

1st Oct.—W. B., age 30, a labourer, admitted to-day. Both bones of his left leg were broken yesterday, about four inches above ankle. The upper fragment of tibia can be felt projecting under skin which is intact. The soft parts in neighbourhood of fracture are swollen, œdematous, and of a purplish red colour. There is evidently much effusion into the tissues. The limb having been put straight was comfortably fixed in lateral splints (Cline's), and slung in a Salter's cradle. Morphia, gr.  $\frac{1}{4}$ , was ordered to be given subcutaneously at bed-time. Temperature, 7 p.m., 99.5°.

3rd Oct. (Third day).—The pain of the injury persisted for twenty-four hours. It has now ceased, and, except for the constrained position, he is in no way disturbed. His pulse and

## CASE I.

DAY OF DISEASE		1	2	3	4	5	6	7	8	9	10	11	12	13
Fahrenheit's Scale.		M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E	M E
	106°	•	•	•	•	•	•	•	•	•	•	•	•	•
	105°	•	•	•	•	•	•	•	•	•	•	•	•	•
	104°	•	•	•	•	•	•	•	•	•	•	•	•	•
	103°	•	•	•	•	•	•	•	•	•	•	•	•	•
	102°	•	•	•	•	•	•	•	•	•	•	•	•	•
	101°	•	•	•	•	•	•	•	•	•	•	•	•	•
	100°	•	•	•	•	•	•	•	•	•	•	•	•	•
	99°	•	•	•	•	•	•	•	•	•	•	•	•	•
	98°	•	•	•	•	•	•	•	•	•	•	•	•	•
	97°	•	•	•	•	•	•	•	•	•	•	•	•	•
	96°	•	•	•	•	•	•	•	•	•	•	•	•	•
	95°	•	•	•	•	•	•	•	•	•	•	•	•	•
Pulse		M 70 E 88	M 84 E 86	M 76	M 70	M 70								

temperature are normal ; tongue clean ; has a fair appetite. The swelling is subsiding.

10th Oct. (Tenth day).—The swelling has gone ; there is no pain. The purple colour of the injured part is changing to yellow. No matter has formed. Patient is every way well.

Twentieth day.—Patient discharged with limb in plaster of Paris bandage.

CASE II. Incised Wound. Shock. Union by First Intention.

5th Oct.—M. T., aged 21, a girl of nervous temperament, was brought to hospital to-day at 11 a.m., with the upper lip completely cut through by the bursting of a soda-water bottle. It was represented that she had lost very little blood, as, on the wound being inflicted, some one present had immediately grasped





its edges between his fingers and thumbs. She was in a semi-conscious, languid state; eyes half closed; the face pale; the surface cold and clammy; the pulse quick, weak and fluttering; the respiration feeble and gasping. The wound was cleaned with warm boracic lotion, and the edges were brought into accurate apposition by means of two hare-lip pins, and a figure of eight suture. A little collodion was then painted over the closed fissure.

Evening.—The condition of collapse present immediately after the accident has passed away, and the patient feels heated and flushed. The temperature has risen one degree. There is slight pain in the wound.

Second day.—The edges of the wound are glued together, slightly swollen, and a red blush extends from them for a quarter of an inch on each side. There is no pain.

Fourth day.—The pins were removed yesterday. The wound seems firmly united. Swelling and redness have subsided. A red-pink streak marks the position of the wound.

Sixth day.—Discharged.

Twentieth day.—Attended for inspection. The pink streak has become pale.

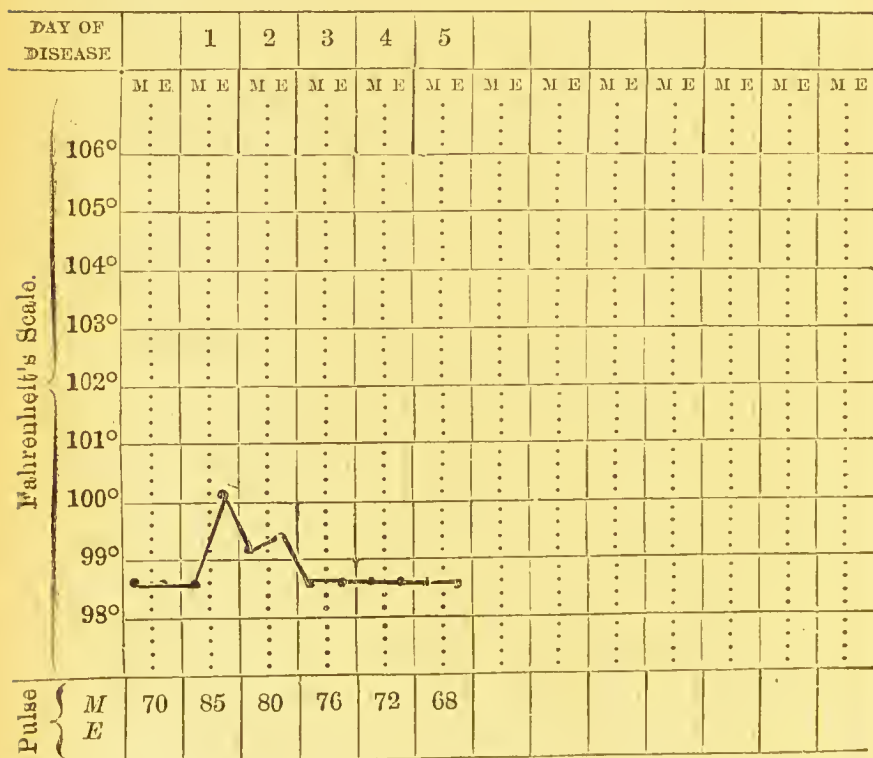
CASE III. Union by first Intention with Simple Traumatic Inflammation terminating in Resolution.

6th Oct.—J. A., age 27, a coal porter; all organs apparently sound, had his leg amputated to-day through lower third of femur for a tumour (sarcoma) of tibia. An Esmarch's bandage having been applied, an anterior and a posterior flap were cut—the former by dissection, the latter by transfixion—these being retracted the bone was sawn across; ligatures were placed on the chief vessels. On the bandage being removed some arteries spouted and were ligatured. There was some delay in checking hemorrhage from the bone. Previous to closing the wound the operating surgeon drew attention to the fact that, owing to the delay just mentioned, “the flaps had already begun to glaze”—*i.e.*, they were becoming covered with a glossy, stieky substance,

which he called "plastic lymph," and on which a red watery fluid stood in beads here and there. The edges of the flaps were stitched accurately together, except at a point through which the end of a drainage tube, that had been laid across the wound, protruded. The tube was inserted owing to the difficulty of applying pressure properly to the end of stump. A large dressing of gauze and absorbent cotton was bandaged over the stump. The patient was then removed to bed.

Evening, 6 p.m.—Patient is in some pain. Temperature  $100^{\circ}$  F; pulse 85. Is sick from the effects of the ether. Ordered  $\frac{1}{4}$  gr. morphia by hypodermic injection at 9 p.m.

## CASE III.



Third day.—Slept well. To-day he is almost free from pain except when the injured part is moved. Tongue clean; tempera-





ture 99°; pulse 80; little or no general disturbance. The dressing on being removed was found heavy with a good deal of bloody serum. There is a redness and slight swelling for about half an inch from the edges of the wound, which adhere one to the other. Drainage tube removed.

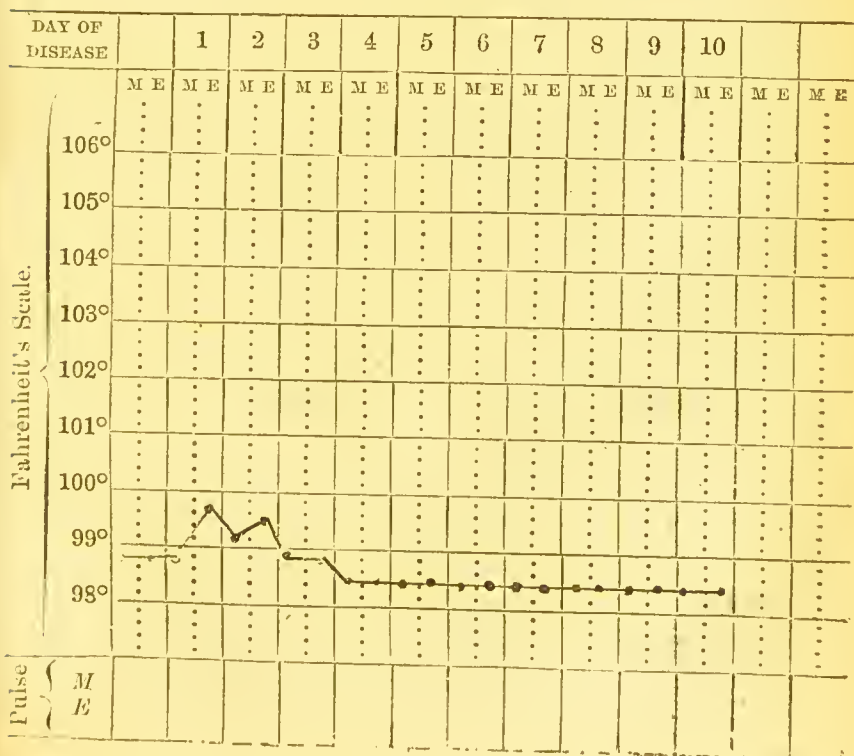
Fifth day.—The patient continues well; no disturbance. The wound again looked at; it is apparently united; swelling and redness have disappeared.

Twelfth day.—The patient has progressed favourably since last report. The wound is now practically healed; a red scar marks the line of incision, and a few granulations the position of the tube.

CASE IV. Second intention, Healing by Granulation.

16th Oct.—Mrs. L. C., age 45, cook; married; three children.

CASE IV.



Personal history, good. Family history, grand-mother died of cancer. Breast amputated to-day for cancer. All glands and fat in the axilla were cleared out. Owing to the amount of skin removed, it was not possible to bring the edges of the wound together; there remained, therefore, a gap in the tissues when the operation was completed. Iodoform was sprinkled on the raw surface, and it was covered with oil silk and a thick dressing of wool and gauze.

Second day.—Dressing removed—saturated with serum and blood. The wound has a smooth, glazed appearance. The pain consequent on the operation has subsided. Patient looks well. Temperature last night, 99.2°.

Fifth day.—Minute tufts (granulations) are appearing on the raw surface, which has lost its glazed appearance and is moist with a creamy discharge. The general condition is good. Temperature normal. A boracic acid dressing and an elastic bandage applied.

Tenth day.—The raw surface is almost on a level with the skin, and is covered with very small, conical, vascular granulations. Joining the granulations at the edge of the wound and losing itself amongst them is to be seen a bluish-pink pellicle gradually becoming white as it joins the true skin. General health excellent.

Fifteenth day.—The sore is on a level with the surrounding parts and is not one half the size it was. The pellicle from the margin is rapidly spreading over it. There is little or no discharge. No pain. Patient very well.

Twenty-fifth day.—The gap left by the operation is quite filled up and healed over, the cicatrix has a bluish, smooth, tender appearance in the centre, while that portion of it which has been longer made is white and more like true skin. Patient discharged.

CASE V. Healing by Third Intention or Secondary Adhesion.

30th Oct.—H. C., age 16, admitted two days ago. About a week previously he had received an injury which tore a portion of the scalp—equal to about two square inches—from the subjacent





parts and left it hanging down over the right eyebrow attached by a narrow pedicle. As it had not been kept in position after being replaced both the under surface of the flap and the part from which it had been torn are covered with granulations. On admission the wound was dressed with a saturated solution of boracic acid. To-day as it looked more healthy the flap was put back in its place, secured there by a few stitches, and bound down by an antiseptic pad and bandage. Temperature normal.

Third day, since closing of wound.—A little discharge has oozed out between the stitches and soiled the dressing. The flap which looked somewhat raised when replaced has subsided to level of surrounding tissues. A fresh dressing applied.

Seventh day.—Stitches removed. Wound has healed.

### Remarks.

Look in these cases for the *disturbances following aseptic injuries* and for the *incidents of repair*.

*Disturbances following Aseptic Injuries.*—In subcutaneous injuries and wounds that heal without suppuration, the absence of inflammatory disturbances is noticeable. Fix your attention upon such cases till you have thoroughly realised this fact. Take notes of cases of simple fracture and aseptic operations of the severest kind and you will find that you seldom meet with a temperature above  $100^{\circ}$ , or other sign of much constitutional disturbance. Whatever slight disturbance may exist will have subsided by the third or fourth day. It is called simple traumatic fever, and is supposed to be due either to a reactionary disturbance of the nervous system, or to the absorption of effusions which have developed toxic ferments (notably fibrin ferment, yielded by defunct leucocytes) while effused. It is inflammation of a mild type. It is temporary, because the irritant that called it forth does not persist. It is the result of the injury, and is not dependent on the healing of the wound which, taken by itself, is a painless process, without local or constitutional disturbance.

In Case II. we have an instance of *shock*, which is one of the general effects of injury. Its degree depends partly on the mental and bodily condition, and partly on the nature of the injury. That mental emotion can produce and regulate shock we all know, and should bear in mind when arranging for the performance of operations. Great nervousness was, no doubt, the predisposing cause in the case under consideration, which well sets forth the usual symptoms.

*Pathology.*—The condition called “shock” is probably an expression of general exhaustion of the nervous centres due to overstimulation of sensory nerves. The stimulation may in origin have been physical or mental, or both combined. In fatal cases, the abdominal veins are found engorged at the expense of the rest of the system. This is to be explained by the vaso-motor nerves and the pneumogastrics sharing in the general exhaustion.

In severe cases reaction may pass to an extreme on the other side, and end in delirium. In the case of drunkards it may end in delirium tremens. Treatment.—Rest in horizontal position, and gentle stimulation when required.

### Incidents of Repair.

The healing of all open wounds consists “in the growing together of the edges by the production of the requisite materials from the old tissues of the parts—all other phenomena, such as excessive granulation, suppuration, &c., are complications, not essentials, of the process.”

Four methods of healing are recognised. 1st. By the first intention or primary adhesion. 2nd. By the second intention or granulation. 3rd. By the third intention or secondary adhesion. 4th. By scabbing.

In cases II. and III. we have the incidents of *union by the first intention*. Had it been possible to examine them microscopically at various stages, we should have seen that plastic lymph glued together the edges of the wound in the first instance, and that a





little later it became infiltrated with leucocytes escaped from the neighbouring vessels—scavengers for the removal of all dead and foreign matter; that they (the lymph and the leucocytes), having subserved their purpose, gave place to fibroblasts—cells derived from the divided connective tissue; that at the same time, from the vessels of the part, numerous buds and loops extended, which uniting with one another vascularised the uniting material, now called *granulation tissue*; that the subsequent stages consisted in these new cells being converted, under cover of a layer of epithelium derived from the old epidermis, into spindles and then into a fibrous cicatrix, which, contracting, obliterated the vessels which hitherto had given the scar a red appearance. Thus we see that an incident which is the cause of death to some cells, is to others, less directly affected, only a stimulus, making them undergo greater formative activity. Under its influence they divide and subdivide, and thus carry out their own repairs.

It was at one time thought that in some cases “immediate union” of a clean cut wound, without the intervention of any fresh material, took place; but this is now known not to occur.

In case IV. we have the incidents of healing by *granulation*, or *second intention*. We saw the surface first covered by a layer of plastic lymph, which gradually melted away, and numerous small conical elevations or granulations appeared. Each granulation is known to consist of a capillary loop forced out by intravascular pressure, around which there is a fine web of connective tissue, entangling serum, leucocytes, and connective tissue cells. Underneath the granulating surface we should have found, had we examined it, a layer of young growing connective tissue elements, the growth of which gradually raised the granulating surface to a level with the surrounding skin, from which there then spread a pellicle of epithelial cells to complete the healing of the wound.

In Case V. when the granulating wound was closed by securing the flap in its proper place by sutures we had an instance of union by the *third intention*, or *secondary adhesion*. This occurs when two granulating surfaces having been brought into apposition, the

pressure obliterates the granulations, and the wound then heals by the first intention.

*Healing by scabbing* simply consists in the healing of a wound under the protection of a scab.

*Granulation Tissue*.—The first tissue formed in the healing process is called granulation tissue. Under the microscope it is seen to be composed of small round cells scantily cemented by a homogenous intercellular substance and traversed by innumerable thin-walled capillaries. The small round cells have been derived by multiplication from the original connective tissue cells of the part. It is a stage at which healing and development often halt, and, therefore, one is constantly coming across *granulation tissue* in pathological investigation. It is important to remember that lymphatics are absent from, and that consequently absorption does not easily take place through, it.

## ORGANIC IRRITANTS.

It will be seen on referring to Bacteriology, page 9, that organic irritants are divided into two classes, styled *non-pathogenic* and *pathogenic*, and that the non-pathogenic—those that produce putrefaction—cannot live in the blood stream, or in the living tissues, while the pathogenic can. The varieties of inflammation depending on the action of these two kinds of organisms are usually divided into the *septic* and the *infective*.

Of septic inflammation we have three degrees—1st. Septic traumatic inflammation, when a moderate dose of the products of decomposition, alkaloids known as *ptomaines*, is absorbed. 2nd. *Sapremia*, or *Septic Intoxication*, when the dose is excessive. 3rd. *Hectic*, when the dose is small and oft repeated.

Of infective inflammation we have local and general kinds. The local kinds are erysipelas, hospital gangrene, wound diphtheria, malignant pustule (the first named alone being common). The





general kinds might be made to include many specific diseases: but septic infection and pyæmia are the two most generally considered under the head of inflammation. These varieties are best studied as they appear in the recorded cases.

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## CLASS II., SECTION "A."—SEPTIC CASES.

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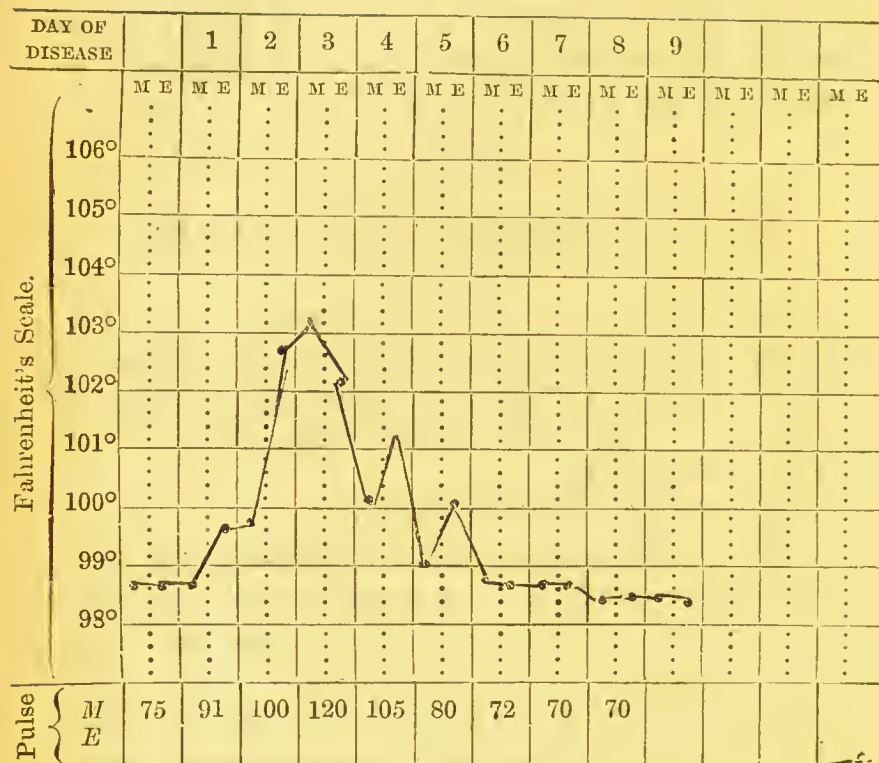
Cases in which organic irritants, of the kind known as non-pathogenic organisms, having found their way into a wound are growing and multiplying there, and in which the body is making efforts more or less successful, to render them innocuous, or to accommodate itself to them.

### CASE VI. Septic Traumatic Inflammation.

19th Nov.—N. G., aged 22. A case of amputation in upper third of thigh, resembling in its progress Case III. in every important particular till a day or two after the operation. [Compare with Case III.]

Third day.—Passed a restless night. Last evening temperature was  $102.5^{\circ}$ , to-day it is  $103^{\circ}$ . He cannot rest the limb in any position. His pulse is rapid (120), face flushed, tongue furred and dry, skin hot and dry, bowels constipated, urine, high-coloured and scanty. He is restless, has no appetite, is very thirsty. The night nurse reports that he was delirious at times during the night. On removing the dressing, the wound and its neighbourhood were found hot, painful, red and swollen. The stitches closing the wound were deeply embedded in the tissues. It was necessary to cut and withdraw most of them, whereupon the lips of the wound opened out in parts, and some blood-stained serum escaped. The gaping openings were further opened, and the drainage-tube, which was blocked with a clot, was removed, cleansed and replaced. The neighbourhood of wound was thoroughly cleansed, the parts dusted with powdered boracic acid and iodoform, and an antiseptic dressing applied. A saline purge ordered.

## CASE VI.



Sixth day.—An improvement in all symptoms has occurred. The temperature has fallen. Patient looks himself, but somewhat wasted. Tongue clean; appetite good. The swelling and redness of wound have subsided, and it is no longer painful. Wound washed out and dressed as before.

Tenth day.—Improvement continues. The open parts of the wound are granulating in a healthy manner, and are moist with creamy pns. They were brought together by means of strips of plaster and dressed as before.

Twenty-second day.—The wound is healed. A rough red scar marks its position.

## CASE VII.—Sapraemia.

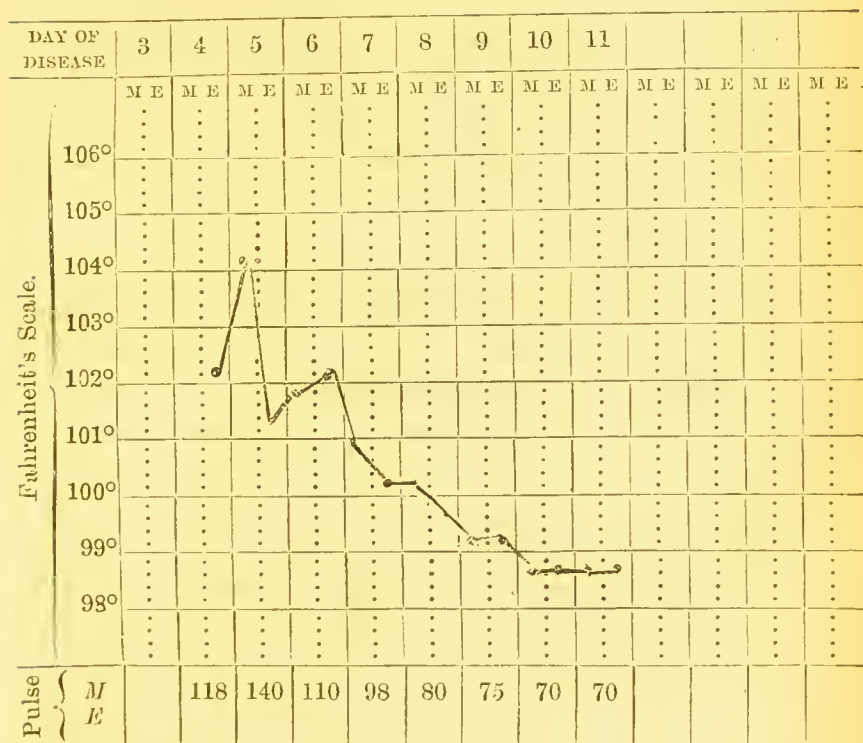
7th. Jan., '95.—O. H., age 16, the son of a farmer, was admitted last evening. Falling from a horse, four days ago on to some





sharp stones, he sustained a small but deep wound on the inner aspect of right knee. The joint is very much swollen, hot, red and painful. During the night the patient had a rigor, was delirious, complained of thirst and headache, and vomited repeatedly; the temperature is  $104^{\circ}$ , pulse 140; he is getting dull and collapsed; the skin is clammy, the tongue is covered with a dry fur, and down its centre there is a red streak; for the last few hours the bowels have been very loose

## CASE VII.



*Treatment.*—The wound was enlarged and a drainage tube was drawn through the joint by means of a long forceps passed into the wound and protruded behind through an incision made on to its points. Into other spots that felt “hoggy” drainage tubes were also inserted; much foul matter escaped. The joint was

then thoroughly irrigated with a bichloride solution 1 in 4,000, secured on a McIntyre's splint and wrapped in a Lister's dressing. An ounce of brandy with an equal quantity of water was ordered to be given every second hour till evening visit.

10th Jan., third day after admission.—There has been a marked improvement in all symptoms referred to in last report. The temperature rose last evening only to 100·5°. The local disturbance has also subsided. The joint has been washed out daily through the tubes, and dressed as on first occasion. The discharge has lost its putrid odour.

Tenth day.—Patient doing well. The drainage tubes have been removed, and a thick dressing of salicylic wool and an elastic bandage applied. No constitutional disturbance.

Thirtieth day.—Discharged to convalescent home. Patient has a stiff limb which under massage grows more supple daily.

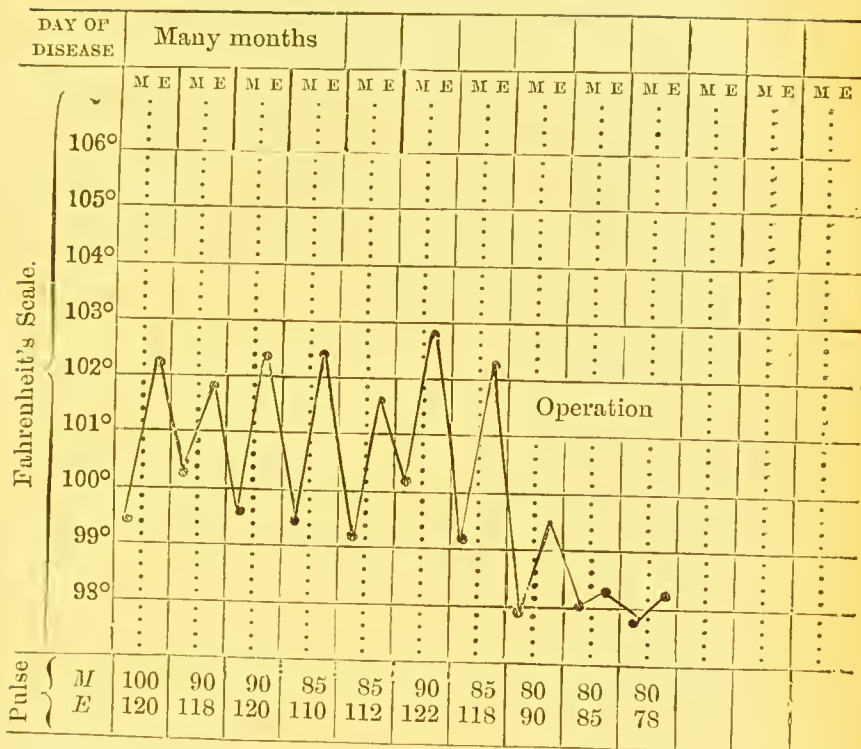
#### CASE VIII. Heetic.

10th Jan.—R. K., age 15, a girl, admitted a week ago. She had suffered for years from scrofulous disease of the knee. Six months ago matter formed in the joint. It has now made its way into all the neighbouring parts and is discharging through the several openings. She is much wasted, and since her admission her condition has been as follows:—On both cheeks there is a patch of redness, the eyes are bright and the pupils large, the pulse is quick and small, and easily excited. Towards evening the temperature rises a few degrees; there is thirst, and the palms of the hands and soles of the feet are dry and burning; when the patient falls into a sleep she awakes melting in perspiration. During the last two days diarrhoea has set in and the perspirations have been less. The liver and spleen are both enlarged, and the urine is slightly albuminous. In consequence of the patient's condition and the extent of the disease, it was yesterday decided to amputate the limb, and accordingly an operation through the lower third of thigh was performed to-day. The steps of it were as in Case III. No drainage tube inserted.





## CASE VIII.



Second day (after operation).—The patient is weak, and her pulse quick and feeble; but her temperature rose only one degree last evening, and the diarrhœa has ceased.

Fourth day.—The hectic fever has ceased. She is already beginning to pick up, and to eat more. The wound was dressed to-day. It was united.

Sixteenth day.—The wound has quite healed. A marked improvement has been daily visible in her condition since the operation.

Thirtieth day.—Discharged. Has put on flesh, and in appearance is not recognisable as the girl who was admitted. A continuous improvement in the condition of the liver, spleen, and kidney is going on.

## REMARKS ON SEPTIC CASES IN GENERAL, AS COMPARED WITH ASEPTIC CASES.

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In contrasting the cases of Class I. with those of Class II., one remarks, Firstly, that in the latter the local and general signs of inflammation are much more pronounced—in fact, in Class I. they are often scarcely noticeable at all. Secondly, that of the four terminations of inflammation—viz., resolution, suppuration, ulceration and gangrene—Class I. appropriates the first and leaves the other three for Class II.

The explanation of this difference is to be found in the fact already pointed out, that an inorganic irritant, as a rule, does momentary violence and then ceases in its action, whereas an organic irritant, obeying the laws of its vitality, struggles to survive, to grow, and to multiply at the expense of its surroundings.

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## REMARKS ON SEPTIC CASES IN PARTICULAR.

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1st. *Septic Traumatic Inflammation.*—Compare Cases II. and VI. In case II., which was one of simple traumatic inflammation, there was only a slight disturbance, lasting for a few days. Here we had to do only with the injury occasioned by the knife. There was nothing to prolong the disturbance, and so the parts quickly entered on the natural process of repair. But in Case VI., by some mischance some of the organisms that cause putrefaction found their way into the wound. In its retained exudations they multiplied (although they do not survive in living tissue, they thrive in serous exudations), and, in fact, converted the wound into a manufactory of ptomaines. These products of decomposition have very irritating chemical properties, and when absorbed into the blood they give rise to fever. They, therefore, account for the local inflammatory trouble noted in Case VI. on the third day, and the





febrile disturbance that accompanied it. "The stitches deeply embedded in the tissues" showed the great tension of the parts, and by this tension the ptomaines were forced into the neighbouring lymph spaces, and into the circulation. In the former locality they excited fresh inflammation, and thus set up an indefinite extension of the vicious process in which they themselves had their origin. As soon as the tension was relieved by the removal of the stitches and the opening up of the wound, the disturbance ceased. For when the serum flows away into antiseptic dressings, as soon as it exudes the non-pathogenic organisms have no pabulum wherein to grow.

Note that the wound was not washed out or in any way forcibly disturbed lest infective organisms should be driven beyond the wall of granulation tissue already partially formed. Now, supposing that the wound had been left untouched, what would have been the issue? The local and general disturbance would have gone on growing till the inflammation terminated in sloughing, probably of the parts between the stitches, and so gave vent to the ptomaine-laden exudations. Such opening would probably not have thoroughly drained the wound; but, nevertheless, the fever would in a great degree have subsided, for the granulation tissue which lines a wound on the sixth or seventh day is found, inasmuch as it is without lymphatics, to be a barrier through which ptomaines will not be absorbed unless the tension is considerable. After this relief a slow process of repair, probably accompanied with "hectic," would have set in, and a tedious recovery would have been the best that could have been hoped for.

Note also the rapid wasting of the muscles that occurred in Case IV. during the few days of fever. The muscles have been aptly styled the "furnaces" of the body, and after severe or prolonged combustion from any cause they are found more or less burned down.

Sapremia or Septic Intoxication—*vide* Case VII.—In this case

the constitutional disturbance was greatly in excess of the local, and threatened a fatal termination in consequence of the large dose of ptomaines manufactured in, and absorbed from, the injured part. The wound which opened the joint, and through which non-pathogenic organisms must have entered, was small and oblique, so that when its edges became swollen it offered no channel for the escape of the products of inflammation. The capsule of the joint limited the local spread of these irritants; but it allowed their accumulation in large quantities, and its powers of absorption favoured their entrance into the blood. The pathology of this disease is the same as that of septic traumatic inflammation. No micro-organisms are found in the blood. In fatal cases no characteristic pathological changes of a definite kind are met with at *post-mortem* examinations.

Hectic Fever.—Case VIII. is a very good illustration of this condition, which occurs in patients who have suffered from prolonged suppuration—notably in those who have suppurating cavities in their lungs. It is probably due to the absorption day after day of small quantities of the products of putrefaction. Any one who has watched this case closely will not fail to recognise “hectic” wherever he meets it. It yields to the same treatment as do septic traumatic fever and sapræmia, of which it is a degree—viz., thorough drainage and disinfection. But, as the case under consideration did not lend itself to this treatment, and owing to the condition of the liver, spleen and kidneys, and the weak state of the patient, it was necessary to arrest the disease at once, amputation was the only alternative. Note the cessation of “hectic” immediately on the removal of the suppurating parts. The liver, spleen, and kidneys were, no doubt, in an early stage of amyloid degeneration, a condition, often met with when there is prolonged suppuration, in which there is deposited in the walls of the small vessels, and in the tissues around, an albuminoid substance staining dark brown with iodine. An immediate arrest of suppuration is the only chance of curing this condition.



days ago in a somewhat feverish state, having a patch of redness on the outer aspect of left thigh. The affected area was swollen as well as red, pitted on pressure and occasioned her burning pain. In its neighbourhood there was a small, deep, suppurating cavity, the result of a wound by a splinter of wood. Since her admission the disease has spread considerably and now covers one-half of the outer aspect of the thigh, which is much swollen, tense, and brawny. At one place there is a large bleb full of sero-purulent matter. The feverish symptoms have also increased. Temperature this morning  $105^{\circ}$ , pulse 120, small and compressible.

*Treatment.*—On admission the bowels were acted on by a saline purge, and the patient was put on tinct. ferri perchlor.,  $\mathfrak{m}$ . 30, three times daily; and a fold of lint smeared with boracic ointment was kept wrapped round the affected part. To-day five or six incisions, one and a half inches in length and parallel to the long axis of the limb, were made into the skin and cellular tissue of the swollen part—the limb having been elevated beforehand, so as to drain it of its blood. The cellular tissue was found distended with serous fluid, which gave it a gelatinous appearance, except at two points, “boggy” to the touch, where it was seen lying like sodden tow in watery pus. This fluid, on subsequent microscopical examination, was found to contain innumerable round organisms arranged in chains (*Streptococci pyogenes*). There had been no indication except to the touch of this change of condition at these spots—no tendency to point. The incisions were immediately plugged with iodoform gauze to check hæmorrhage and the part wrapped in an antiseptic dressing. Brandy,  $\mathfrak{ss}$ ., every third hour; milk, eggs, and beef tea *ad lib*. Quinix mur., gr. iii., to be added to each dose of the mist. ferri perchlor. Limb to be dressed *twice* daily, and pulv. iodoform and acid borie plentifully dusted into wounds.

9th April.—There has been a general tendency in the gelatinous cellular tissue, as seen through the incisions, to break down into pus and sloughs. A blunt probe, entered through one of the anterior





openings, passed readily backwards between skin and museles to the posterior aspect of the limb, where an incision made on to its point gave exit to a quantity of ichorous pus. A large drainage tube was attached to the eye of the probe and drawn through, and the cavity in which the pus had been lying having been well irrigated with boracic lotion, the part was dressed as on the previous occasion.

10th April.—The patient's temperature rose suddenly last evening. To-day a fresh patch of induration and redness marks an extension of the disease on the anterior aspect of the thigh. Treatment as on the 7th inst.

11th April.—The patient is decidedly better—*Vide* chart. There is a marked subsidence of the inflammatory condition of yesterday.

12th April.—Doing well. In no part does the destructive process seem to have extended through the deep fasciæ, in consequence, no doubt, of the superficiality of the infecting wound. Some large sloughs which interfered with drainage have been drawn out through the posterior incision.

13th April.—The patient is progressing most satisfactorily, but she has been terribly pulled down by her illness.

23rd April.—The patient has improved from day to day, and is now quite convalescent. Gentle massage is being employed to remove stiffness from the affected limb.

28th April.—Discharged.

#### REMARKS.

This case fairly illustrates the process of local infective inflammation. Refer to the remarks on pathogenic organisms, and see how far they explain the incidents noted. In the wound caused by the splinter of wood pathogenic irritants made a lodgment, and thence invaded the neighbouring tissues, where they found a favourable soil in consequence of the patient's ill-health. Note that their progress was to some extent influenced by anatomical considerations. The joint of the knee and the deeper structures

were not invaded. The spread of the disease was rapid, but it was not of indefinite extent; there was evidently some condition or force that put a limit to its progress. It may be that invading organisms grow weaker after a time, poisoned by their own excreta, and then fall a prey to the phagocytes. The temperature of the body bore a direct relation to the local disturbance. This is usual, and is supposed to be a measure of the antagonistic action of the phagocytes on the noxious organisms, for in some cases where the tissues offer no resistance to the invaders, the local infection rapidly becomes general, and proves fatal, the temperature falling below the normal as the condition grows worse.

The suppuration and sloughing witnessed in Case IX. are also characteristic of most of the infective inflammations. They were probably due to the caustic action of chemical substances produced by the cocci; no doubt the tension of the parts helped on the destructive process. It was to relieve this that free incisions were made. Bear in mind that this disturbance is due to the invasion of a part by living organisms, and it will be plain that the same immediate and satisfactory results cannot be expected from free and well placed incisions, as is the case when they are applied to drain a collection of decomposing exudation. Many infective inflammations will spread no matter how freely incised. Nevertheless, incisions do much good by relieving tension, by giving exit to exudation laden with infective organisms (which, if retained, would probably decompose, and so introduce septic complications), and by furnishing channels through which antiseptics can be brought to bear on the invading microbes. In the early stages of some cases of erysipeloid disease, such as whitlow, moist heat does much good, probably by favouring the escape of leucocytes from the blood vessels, and so strengthening the defence.

*Erysipelas*.—Two other varieties of this disease are met with—the *cutaneous* and the *cellular*. The latter is an inflammation similar to that just described, not, however, primarily engaging the skin, but spreading to the cellular tissue generally. The diffuse





cellulitis following a dissecting wound is an instance of it. It is dependent on the same irritant (*Streptococcus pyogenes*), is likewise predisposed to by all bad conditions of health, such as that which comes from bad sanitation, alcoholism, Bright's disease, diabetes, &c., and should be treated on the same principles.

*Simple cutaneous erysipelas*, though classed with the foregoing, is now generally looked on as a distinct disease. It depends on a micrococcus—the *Streptococcus erysipelatosus*—entering the system through a wound, which is, however, sometimes so trivial as to escape notice, and so some cases are spoken of as idiopathic. Here is an ordinary instance of its occurrence. The nurse reports that patient "X.," in whom there is an open wound, and who has been doing well, is out of sorts, has had a chill. His temperature is  $103^{\circ}$  or  $104^{\circ}$ ; he has vomited, and shows general signs of inflammation. On examining the wound, it is found dry and unhealthy, and either then or some time within forty-eight hours a patch of vivid redness marking the ground occupied by the invaders is noticed in the neighbourhood. The area is well defined and slightly œdematous, but it is highly so if loose cellular tissue, like that round the eyes, is engaged. Sometimes the cuticle is raised into blebs. Watching such cases from day to day, one sees that the tendency of the invading host of micrococci is to spread. The line of their advance is marked by the sharply-defined and slightly raised edge of the inflamed patch, while in their rear the skin fades off into, and gradually resumes, its natural appearance. Suppuration seldom or ever occurs. Recovery usually takes place in a week or so, and is followed by desquamation. However, if the patient is a bad subject, he may pass into a low typhoid state.

*Treatment.*—The febrile disturbance should be treated on general principles. Tincture of the perchloride of iron, in full doses, has been found to be beneficial. Locally, boracic ointment spread on lint may be applied, or the part may be dusted with equal parts of oxide of zinc and starch, and covered with a layer of cotton wool.

The other local infective inflammations are rare diseases, which further illustrate, but do not alter, what Case IX. has told us of the local behaviour of pathogenic organisms, and of the indications for treatment.

*Hospital gangrene* occurs where wounded are crowded together under bad hygienic conditions, as is sometimes unavoidable in times of war. It is characterised, as the name implies, by gangrene and sloughing of the affected parts.

*Wound diphtheria*.—In this disease granulating wounds become covered with a greyish membrane, the work of a specific micrococcus.

*Malignant Pustule or Charbon* is the work of the *Bacillus anthracis* (got from animals suffering from splenic fever). It occurs as a pustule which dries into a black slough, surrounded with a ring of vesicles, and standing in an inflamed and infiltrated area (see page 106).

### General Infective Diseases.

General infective diseases include Septic Infection and Pyæmia. They are conditions due to the growth and multiplication of pathogenic organisms in the blood, and to the dissemination of such organisms by the blood, and are distinguished from one another by the occurrence in pyæmia of abscesses in the viscera and other parts. Both have their origin as a rule in ill-drained, unhealthy wounds, from which the blood, when deteriorated by bad hygienic conditions, appropriates organisms which multiply in and live upon it.

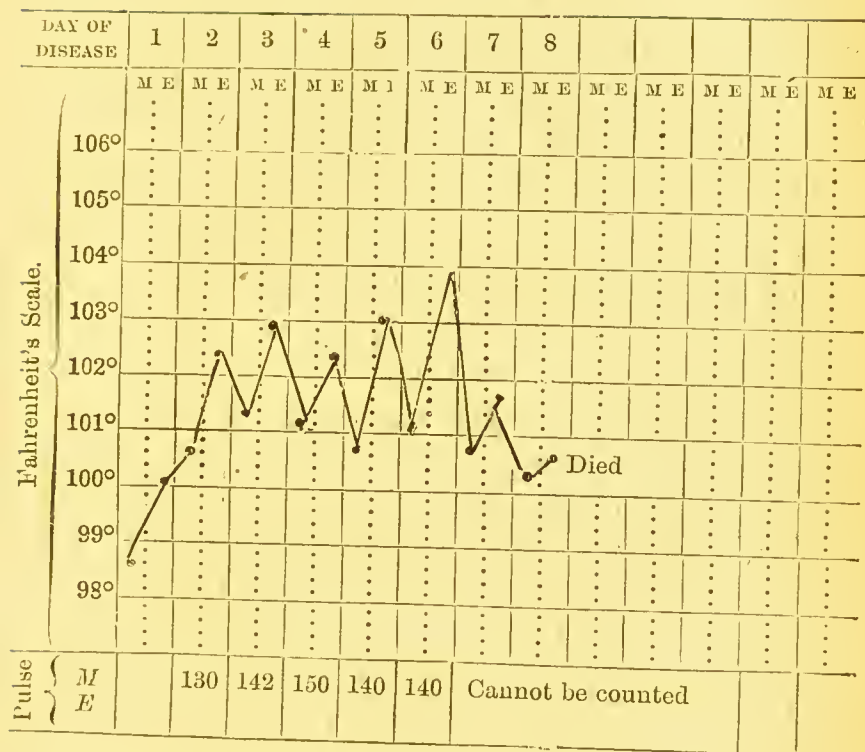
CASE X. Septic infection or Septicæmia. (From Hospital Records, 1889.)

12th March.—P.L., age 23, an exceedingly nervous, despondent man, operated on yesterday for varicoccle, at his own urgent request, as it gave him great mental distress. Half an inch of the engaged veins was excised between ligatures. The operation was conducted with antiseptic precautions. A Lister's dressing was applied.





## CASE X.



Second day.—The patient's temperature was 100° last evening, and he was somewhat restless. Otherwise there is nothing particular to note.

Third day.—About 2 p.m. yesterday the patient had a slight rigor, and his temperature subsequently rose to 102.5°. He was depressed during the day, and during the night vomited, and slept none. To-day he is flushed and complains of headache. Temperature 102°, pulse 130. The edges of the wound are slightly swollen and everted, and yield a little serous discharge. All stitches were removed; the wound was opened up and well irrigated with 1 in 20 carbolic lotion, dried, and then dusted with iodoform and boracic acid, and redressed. Ordered quinine gr. v. every third hour, and as much brandy and fluid nourishment as he can be got to take.

Fourth and fifth days.—Nothing particular noted.

Sixth day.—Patient's temperature last evening was  $103.5^{\circ}$ . He was delirious during the night, and vomited a good deal. He is passing into the "typhoid state," a condition preceding a fatal termination in many diseases, and indicated by the following symptoms :—Increase of temperature, decrease of vital functions, great nervous depression, low delirium and stupor, tremor of muscles; pulse quick, small, and soft; tongue brown, dry, and crusted, especially in the centre; sordes on teeth.

Eighth day.—The patient having gradually grown worse, temperature  $97^{\circ}$ , died at 1 p.m. to-day.

*Post-mortem* appearances thirty-six hours after death.—Decomposition has begun already to set in. In the wound there is no attempt at union, and instead of pus a discharge like gruel bathes it and infiltrates the tissues in the immediate neighbourhood. The veins that were ligatured are darkly stained and somewhat thickened, but they contain no clot. The heart, spleen, and kidneys are pulpy (the finger being easily shoved through them), and on their surfaces are extravasations of blood. Similar extravasations (petechia) were also found in other localities. In the cavities of the pericardium, peritoneum, and pleura, some serum stained with the colouring matter of the blood was found, and the tissues generally seemed stained with this fluid. The posterior parts of both lungs were deeply congested. No abscesses or centres of inflammation were found in the viscera or other parts. On examination of the blood microscopically cocci were found in large numbers, but were not further identified.

#### REMARKS.

Koch's experiments on mice (*vide* p. 12) would lead one to expect septic infection to be of frequent occurrence; but such is not the case. Micro-organisms behave differently in different species of animals, and it is only in exceptional instances that we find in





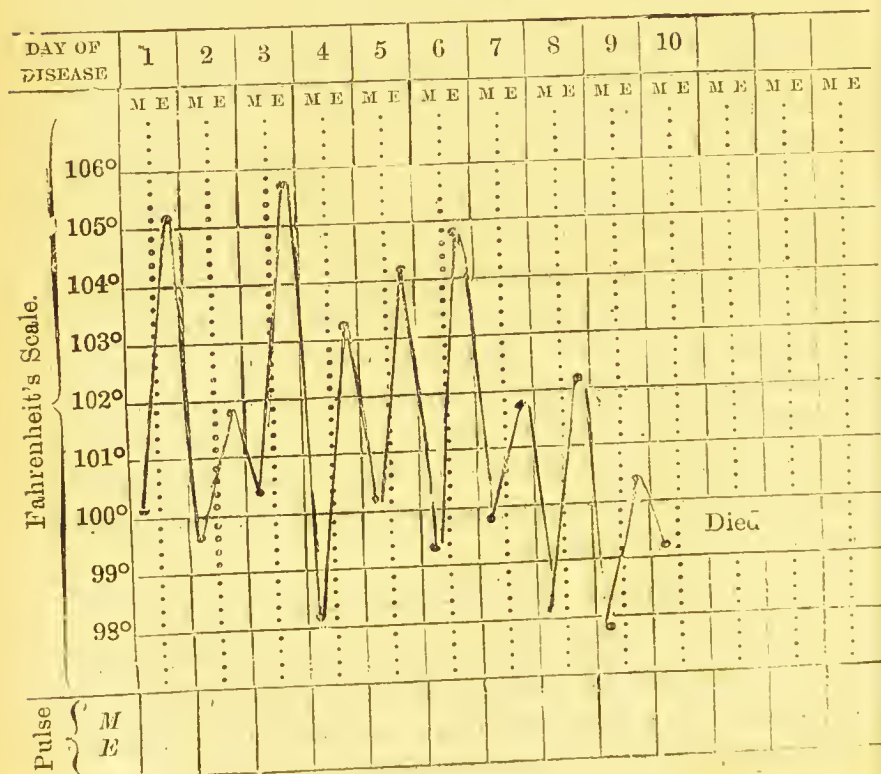
practice what we may name a true case of septic infection. Case X. is the only one that we have met with in these wards for many years. We distinguish it from case VII., which was one of sapræmia or septic intoxication (a comparatively common affection), and which it much resembled in its symptoms, by the absence of any collection of putrid fluid sufficient to supply the chemical irritants on which sapræmia depends, and by the presence of micro-organisms in the blood. From pyæmia we distinguish it by the absence of secondary abscesses. It is supposed by some that there is no such disease in man as septic infection, and that the cases returned as such are cases either of sapræmia, in which the primary *depot* of putrid matter has been overlooked, or of pyæmia, in which death has occurred before the development of the characteristic secondary abscesses. The explanation of why this case in particular should have been attacked with septic infection must, I think, be sought for in a great nervous depression that preceded the operation. It is well known that such a condition has an inhibitory influence on whatever force it is that opposes the multiplication of micro-organisms in the blood. The symptoms and *post-mortem* appearances of septic infection are fairly well set forth in the recorded case, which also illustrates very clearly a condition often met with when there is blood poisoning from any cause, and which is known as the typhoid state. Treatment in this case seemed to have no influence whatever on the progress of the disease. The organisms having found their way into the blood seemed to find a congenial soil there, so the disinfection of the primary wound had no influence on them. This, however, should not prevent one from trying again the same treatment in similar cases. It is all that one can do.

CASE XI—Pyæmia. (From Hospital Records, 1888.)

1st January.—S. L., age 36, a labourer. This day week some varicose veins on the inner aspect of left leg were excised. One of the veins operated on terminated in an ulcer, from which a few weeks ago there was very severe hæmorrhage, causing him to seek

admission into hospital. It was thought that the operation was performed with complete antiseptic precautions, but the ulcer must have been insufficiently disinfected, for from it septic inflammation has spread. Last evening he had a severe rigor, and his temperature registered  $105^{\circ}$ . During the night he vomited a good deal, and slept none. To-day his face is flushed and anxious; tongue dry and furred; temperature  $101^{\circ}$ ; pulse 120. He is restless, and there is from his body a sweet, yeasty smell, said to be characteristic of the disease. The wounds are found to be only apparently closed, and they yield on pressure unhealthy looking pus. The long saphenous vein and several of its tributaries are red, swollen, and tender; the popliteal vein is also affected.

## CASE XI.







*Treatment.*—The wounds were opened up, washed out with carbolic acid solution 1 in 20, bichlor. solution 1 in 2,000, and covered with a Lister's dressing. To the veins, as the implication of the deep veins contra-indicated any more active interference, oleate of mercury, ext. of belladonna and glycerine, mixed in equal parts, were applied. Brandy,  $\frac{1}{2}$  oz., was ordered every second hour, together with eggs, beef tea, and milk.

Third day.—Since last report he has had two rigors, accompanied by a sudden rise of temperature to  $105.5^{\circ}$ , and followed by profuse sweating. He is wasting rapidly. The skin has a jaundiced hue. There is great nervous prostration. Same treatment continued.

Sixth day.—He grows worse daily; rigors and sweating continue to recur, sometimes twice in the day, accompanied by rapid rises and falls of temperature. Symptoms, previously referred to, continue present in an extreme degree, and diarrhoea is superadded.

Eighth day.—Abscesses have formed in the right knee and left elbow joint, which on being opened yielded healthy, creamy pus. The patient is passing into the "typhoid state."

Tenth day.—Died at 6 a.m.

*Post-mortem* thirty hours after death. The appearances were similar to those found in Case IX., with these additions:—The affected veins were found filled with thrombi, in various stages of softening and decomposition. In the lungs, spleen, and liver were numerous abscesses, varying in size from a pin's head to a walnut. Pus was found in the left pleura, subcutaneously in the right thigh, and in the joints already mentioned as being affected.

#### REMARKS.

In connection with this ailment the following terms come into use:—*Thrombosis*, a coagulation of the blood within the vessels during life; *thrombus*, the clot so formed; *embolism*, a transportation and impaction by the circulating blood of a solid substance in a vessel too small to let it pass; *embolus*, the substance impacted;

*infarction*, the hæmorrhagic or necrotic changes which occur in an area deprived of its arterial supply by the blocking of a terminal artery; *infarct*, the area altered.

When the micro-organisms of suppuration find their way into the blood, and give rise to secondary abscesses in the viscera and other parts, the disease is said to be pyæmia. These microbes spring, as a rule, from pent up collections of pus, and gain an entrance, in the majority of cases, through the veins, notably the patulous veins of bone; and in the progress of such diseases as septic phlebitis, infective periostitis, and osteomyelitis. *Neglect of sanitation is a powerfully predisposing cause.* The symptoms and pathological appearances are those noted in Case No. XI., and differ but little from those of other forms of septicæmia, except in the occurrence of metastatic abscesses. It is, therefore, round these abscesses we have to fix our attention. They are due to the arrest at the affected points of organisms carried there by the blood; for pyogenic organisms appear to be incapable when moving with the blood of putting forth their pus-forming power. The process of formation is usually as follows:—A thrombus forms in a vein as the result of injury or the extension of disease. If the vein communicates with a septic area an infection spreads through the clot and thence to the walls of the vein, causing extension of inflammation and further clotting of indefinite extent. The clot so formed is, owing to the organisms growing in it, in a state of disintegration, and when it projects into a larger vein portions of it easily become detached, are carried on by the stream, and are impacted in the lung, or, if it is a tributary of the portal vein that has been affected, in the liver. Some very minute portions may pass through the lung into the arterial circulation and be arrested at some point of its distribution. Wherever arrested, each embolus, since it carries in it the factors of suppuration, forms an abscess. These abscesses are called “primary embolic abscesses.” When they give rise, as they frequently do in the lung, to thrombosis of the veins in their neighbourhood—or, in other words, when the

process to which they themselves owe their origin starts afresh from them, and further abscesses are so formed—the name “secondary embolic abscesses” is given to these later formations.

In addition to the foregoing, there are also abscesses which owe their origin to emboli formed entirely of aggregated micrococci, and there are collections of pus in the serous and synovial cavities which are probably dependent upon the condition of the blood and not upon emboli at all.

It is characteristic of these abscesses that they form insidiously, painlessly, and rapidly. They are, as a rule, most numerous in the lung—the main terminus of the venous system—where they vary in size from a pin’s head to a walnut. The contained pus is usually sweet and laudable, but occasionally the emboli may carry non-pathogenic organisms, and so give rise to decomposition and to poisoning by ptomaines, as in sapræmia.

The case before us sets forth the ordinary symptoms of pyæmia, and after what has been said about pyæmia in general, scarcely requires explanation. The early engagement of the popliteal vein precluded excision of the engaged superficial veins, while resection of the femoral vein would most likely have caused gangrene of the limb. In pyæmia depending on thrombosis of the lateral sinus excellent results have been got from dividing and ligaturing the internal jugular vein and clearing out the infected area. To try and get rid of the primary source of infection, even after one or two rigors have occurred, is good surgery, and if there is a fair probability of being able to do so, an operation for the purpose should be boldly and promptly undertaken.

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## TERMINATIONS OF INFLAMMATION.

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INFLAMMATION, as we have seen in the foregoing cases, may terminate in—

1. Resolution.—When in healthy subjects an irritant does not persist, and has not done serious damage, the disturbance excited by it subsides, the exudation returns by the natural channels, and resolution of the inflammation is said to have taken place.

2. New Growth.—In studying the process of repair, we have seen that an irritant may stimulate cells removed from its acute action to proliferation and growth, and so it may cause inflammation to terminate in the formation of new tissue. The connective tissue cells are those chiefly acted on.

3. Necrosis may occur either as *suppuration*, including *abscess*—i.e., molecular death in the substance of a part; and *ulceration*, molecular death on a free surface; or as *sloughing* and *gangrene*, death “*en masse*,” the tissues perishing before there is time for complete disintegration of their individual elements, their original structure being, therefore, recognisable.

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### SUPPURATION AND ABSCESS.

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Suppuration in the substance of a part may be circumscribed (abscess) or diffuse.

#### ABSCESSSES

Are divided into acute and chronic or cold. The latter variety will be treated of later on as a tubercular disease.

An Acute Abscess consists of a wall of leucocytes surrounding a clear fluid (liquor puris), in which dead leucocytes (pus cells) and cocci are floating. It is formed in this way:—

Pyogenic organisms—usually staphylococci or streptococci—having become located in a part, they proceed, if conditions are favourable, to grow and multiply. In doing so they form certain chemical products, which soak into the surrounding tissues, causing inflammation, ending in disintegration. Into the area so affected leucocytes crowd. The continued action of the cocci causes the leucocytes in the centre to die, in other words, to become pus cells, while, at the same time, by causing the affected tissues to liquefy and by preventing the coagulation of the inflammatory exudation, it forms the other constituent of pus—liquor puris. This collection of matter, of course, acts as an irritant to the parts in which it lies, and all the phenomena of inflammation are kept going by it. The abscess enlarges by an extension of the process which formed it, fresh exudation increasing its tension and forcing irritants beyond any zone of leucocytes or granulation tissue that may have formed. This enlargement is in the direction of least resistance, usually towards the surface; and so the abscess points and bursts. When opened, whether by Nature's method or by incision, the contents escape, tension—the chief cause of extension—is relieved, and the walls fall more or less together. Where the walls come in close apposition, union by the first or third intention may take place, while any cavity left must heal by the second intention.

When the irritant persists—as when there is dead bone, a foreign body, or some irritating secretion or excretion in connection with the cavity—the walls usually narrow into a track called a *sinus* (or a *fistula* when it is in connection with any secreting or excreting channel) through which matter continues to flow. Every abscess does not terminate by emptying out its contents. Sometimes, though rarely, after suppuration has gone some way, the destructive process comes to an end, owing, perhaps, either to some unusual feebleness of the cocci or unusual energy of the leucocytes, and the

pus formed becomes encapsuled in a layer of granulation and fibrous tissue. After a time the fluid part of the pus may become absorbed, leaving the solids behind as a cheesy-looking mass which may lie stationary, may set up fresh inflammation, or may calcify and disappear.

*Diffuse Suppuration* or purulent infiltration is usually the work of the *Streptococcus pyogenes*, the peptonising power of which is very great. It corresponds to the process just described except in the point of difference indicated by its name. As the irritant grows it is rapidly diffused by the tension it creates through the lymph spaces.

*Pus* resembles fairly thick yellow cream; it is slightly viscid and alkaline. It consists microscopically of a clear fluid and pus cells  $\frac{1}{2500}$  of an inch in diameter, globular, granular, and containing a bi- or tri-partite nucleus. Pus with the above characters is called healthy or laudable—other varieties are styled sanious, ichorous, and curdy. As Ogston long ago pointed out, cocci are found in the pus of all acute abscesses. Puriform fluid is a fluid formed by disintegrating tissues without pus globules.

*Symptoms indicating Suppuration.*—General: chills, rigors and febrile disturbance. Local: the cardinal signs of inflammation, together with œdema, and later on fluctuation. When the matter points the skin becomes red and glazed and the cuticle abraded.

*Treatment.*—Position—Rest; Purgation; Hot moist applications, with or without a chemical antiseptic; Unguentum Belladonna. Evacuate contents by incision and drainage, by Hilton's method, or by aspiration. When you aspirate as a means of diagnosis, if the matter is deep leave in needle as a guide for the knife. An early evacuation is specially indicated when (1) there is much constitutional disturbance; (2), when the pus is under a membrane, such as dense fascia, periosteum, sheath of tendon; (3), when by pressure it interferes with any important function of body; (4), when there is danger of its opening into some important part, such as a serous cavity, a joint, a blood-vessel; (5), when





by bursting it might leave a disfiguring mark; and (6), when the lymphatics or veins show signs of irritation.

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## ULCERATION.

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When the process of suppuration occurs on a free surface it is styled ulceration. You may describe an ulcer as an unclosed abscess, or an abscess as a closed ulcer, and apply one description—that given in last chapter—to the formation of both. Pyogenic organisms are not as favourably placed for growth and multiplication on a free surface, even when abraded, as they are when situated in the substance of a part. Firstly, because they are more easily got at and removed; secondly, because the tension, which is such a powerful factor in the spread of inflammation, is wanting. Hence we rarely find non-specific ulceration persisting unless the irritant also persists, as is the case, for instance, when dead tissues remain in contact with the living; or unless one or more of the pre-disposing causes of inflammation are present—viz., something that interferes with the nutrition or the innervation of the part, such as passive congestion, want of rest, diseases affecting the quantity or quality of the blood, or degenerative changes in the nerves.

Paget divided ulcers into three classes:—1st. Simple or healthy ulcer. 2nd. Varieties depending on constitutional causes. 3rd. Varieties depending on local conditions. This classification is not now usually adopted, for both local and constitutional causes go to the production of nearly every ulcer, and it is hard to assess their relative force.

We now generally find ulcers put down as—1st. Healthy or healing ulcers. 2nd. Specific ulcerations, such as syphilitic, tuberculous, lupous, cancerous. 3rd. Non-specific varieties which clinical experience shows to be common—viz., the indolent, the irritable, the inflamed, the sloughing, the weak, the exuberant, the eczematous, &c. These belonging to class 3 occur usually on the lower

half of the leg. An ulcer may be in a spreading, a stationary, or a healing condition. In describing it mention is made of its locality, size, and shape, the characters of the surrounding skin, the edge, the surface, the base, the discharge, the presence of pain or tenderness.

#### THE HEALTHY OR HEALING ULCER

Shows us the process of healing by granulation, or the second intention, *vide* p. 25. As the term ulceration implies destruction, not repair, it is not properly applied to it.

#### SPECIFIC ULCERATIONS

Will be dealt with when we come to specific diseases. The process is, as a rule, similar to that wrought by pyogenic organisms. "The original tissues are first infiltrated by cells foreign to the part which destroy them, and occupy their place. Then, in their turn, the new cells perish, and are thrown off superficially with a fluid discharge, and thus a progressive destruction of tissue takes place."

#### NON-SPECIFIC ULCERS OF THE LEG, THEIR CONNECTION WITH VARICOSE VEINS AND PASSIVE CONGESTION.

Varicosity of the veins, especially when it affects the smaller venules in the skin, leads to congestion and imperfect nutrition, and, finally, to chronic inflammation of the skin (*chronic dermatitis*), marked by an excessive formation of epidermis, by a serous oozing (varicose eczema), pigmentation and a brawny condition of the skin and cellular tissue due to plastic infiltration. When an abrasion occurs it heals with difficulty, owing to the malnutrition of the parts consequent on congestion and infiltration. Through the abrasion pyogenic organisms enter, and easily establish themselves, and so is started a process of ulceration which, under the influence of the state of the patient's constitution, may assume any one of the varieties already mentioned. That passive congestion is the chief factor in producing these ulcers may be inferred from the fact that they seldom appear anywhere but on the lower half of





leg, and that whatever relieves the congestion has a most beneficial effect upon them. There is, properly speaking, no special varicose ulcer, but a large proportion of ulcers are of a varicose kind, or at least dependent on venous congestion.

#### THE INDOLENT, CHRONIC, OR CALLOUS ULCER

Is generally situated between the ankle and calf; is of any size or shape. The surrounding tissues are generally in an advanced stage of that condition just described as resulting from varicose veins. Its edges are raised, hard, and irregular; its surface is depressed and covered with a yellowish layer, sometimes with pale, badly-formed granulations; the base is hard and fixed; the discharge is serous and scanty; there is no pain or tenderness.

#### THE INFLAMED ULCER.

The indolent or any ulcer may become inflamed. There is heat, redness, pain, swelling, and œdema of the ulcer and its surroundings. Its edges are sharp-cut, and it discharges sanious serum.

#### THE SLOUGHING ULCER.

An exaggerated condition of the inflamed ulcer. The edge is jagged and overhanging, and evidently breaking down. It is often of syphilitic origin.

#### THE WEAK ULCER.

When what would otherwise be a healthy ulcer lacks the healing edge, and its surface is raised and covered with large, œdematous granulations, it is given the above name.

#### THE EXUBERANT OR FUNGOUS ULCER.

This is also an ulcer with excessive granulations, but instead of being large and œdematous, they are closely packed and florid. It is met with after burns, and resembles an exuberant cancerous ulceration.

#### THE IRRITABLE ULCER.

A small superficial ulcer, with slightly raised irregular edges

and scanty discharge, generally situated behind or below one of the ankles; associated with varicose veins, and occurring chiefly in women beyond middle life. It is intensely tender and painful. By feeling with a probe some exposed nerve fibres can, as a rule, be detected. This name is also given to an ulcer which is a fissure of the rectum.

### THE ECZEMATOUS ULCER.

Eczema as a local (*vide* previous page) or constitutional condition may lead to an abrasion of the skin and to the formation of any of the already mentioned varieties of ulceration.

*Treatment of Ulcers.*—Four points claim attention:—1st. Elevate the limb, and give it rest by means of a pillow, splint, Salter's cradle, or other appliance. 2nd. Make the sore aseptic. This is best done by treating it and the skin in its neighbourhood very much as one treats the skin of a region about to be operated on (*vide* page 64). If, however, the sore is irritable, hot boracic solution may be substituted for corrosive sublimate solution. Whichever is used, the moistened gauze should be covered with a waterproof material, and the poultice so formed should be changed morning and evening for a few days. In some cases carbolic oil, 1 to 5, or undiluted carbolic acid may be applied to the sore. 3rd. The sore having been made aseptic, any persisting faulty conditions of the sore and its margins must be attended to. In the case of callous ulcers, pressure by means of strapping—Baynton's method—or by Martin's elastic bandage should be applied. A layer of oil silk, perforated and covered with boracic lint or a sprinkling of iodoform, should intervene between the ulcer and the strapping or bandage. For inflamed, and sloughing, and irritable ulcers, hot boracic fomentations, boracic poultices, lead and opium lotion, and soothing applications generally are in use; while for weak and exuberant ulcers, sulphate of copper, astringent lotions, and pressure are indicated. When a large





surface has been destroyed by ulceration, healing may be expedited by skin grafting. 4th. Correct any constitutional disturbance that may be present—gouty, anæmic, strumous, menstrual, &c., &c.

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## GANGRENE AND SLOUGHING.

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These are terminations of inflammation, but they are due also to other causes. As sloughing is only a degree of gangrene one description will cover both.

Gangrene signifies the death and putrefaction of a visible portion of tissue. Whatever robs a part of its nutritive supply or kills its cells may be a cause of gangrene—viz.: 1st, *inflammation*. It acts in both ways, for it lowers the vitality of the tissue, and it at the same time robs them of their nutrition, both by the pressure of exudation and by causing coagulation in the capillaries; 2nd, obstruction of arteries, capillaries, or veins; 3rd, diminished cardiac power; 4th, physical and chemical agencies, including pathogenic organisms. These factors are often combined in one case. We had lately in the wards a patient with a fatty heart, atheromatous arteries, varicose veins, and emphysematous lungs. In this case a very slight injury terminated in gangrene. Gangrene may be moist or dry. When the conditions are such as interfere with the supply of blood to a part and favour its return it is dry; when the reverse is the case it is moist. When gangrene sets in, the affected part becomes of a pale, earthy colour, cold, without sensation; it crepitates when pressed, and the cuticle when touched moves on a moist, slippery under-surface; later it becomes greenish-black and has a decomposing odour. When the gangrene ceases to spread the septic dead parts irritate the living tissues in contact with them, and a line of demarcation (congestion) forms, followed in course of time by a line of separation (ulceration). Finally this ulceration, assisted by the action of the phagocytes, amputates the dead part now styled a sphacelus or slough. Note that it is in the living tissues the ulcera-

tive process goes on, and that it is excited by the septic character of the slough. When necrosed tissues are aseptic, as often happens when there is necrosis of internal parts, as, for instance, a simple infarct, no suppuration occurs. They excite only a simple inflammation leading to the formation of fibrous tissue, in which the dead mass becomes encapsuled. This mass, after undergoing fatty metamorphosis, is eventually removed by the phagocytes, leaving only some scar tissue.

Gangrene is divided into the local and the spreading. The former is due to factors, such as embolism, that act simultaneously over a large area, the latter to irritating microbes acting under conditions predisposing to gangrene.

We meet with the following varieties of gangrene;—1, Inflammatory; 2, Traumatic; 3, Hospital; 4, Diabetic; 5, Senile.

*Treatment.*—The following are the indications:—Try and remove everything that seems to interfere with the freedom of the circulation, whether the tension of inflammation or the constriction of a bandage; keep the part warm, elevated, and aseptic; in suitable cases amputate, awaiting in spreading gangrene the line of demarcation. Support the patient's strength, and give opium if the nervous system is distressed.

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## REMARKS ON CERTAIN VARIETIES OF INFLAMMATION.

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The inflammatory process assumes various phases, its characters depending on its being acute or chronic, on the tissues engaged and on the diseases with which it is associated.

*Chronic inflammation* is a process pathologically analogous to the acute. The difference is in degree not in kind. Both constructive and destructive changes are covered by the term inflammation, and in chronic cases one often sees them in progress together. One sees an area undergoing slow disintegration





surrounded by a margin of fibroid thickening, which does not go on to complete organisation. The incidents that excite the condition act partly as irritants, partly as stimulants, so there is a halting between a destructive process and one of repair. When there is growth in chronic inflammation it is of the less highly organised structures, such as the epithelial and connective tissues, the latter often to the detriment of the venous circulation and of the special cells of the structure engaged. In the production of chronic inflammation, predisposing causes play a much more important part than in the acute variety. Of these, passive congestion is the chief, after which come the constitutional conditions occasioned by scrofula, syphilis, gout and rheumatism. Sometimes in chronic inflammation, especially of a tubercular kind, the exudation and the tissues undergo a fatty degeneration and disintegration, and then dry up into a cheese-like substance. This process is styled *caseation*. The material formed may, at a later period, be absorbed, or salts of lime may be deposited, when it is said to undergo *calcification*, or it may soften and break down into a cold abscess.

*Catarrhal inflammation* furnishes an instance of inflammation assuming fresh characters in consequence of the tissues engaged. It occurs when epithelial surfaces are affected, and its peculiarity consists in the epithelium continuing to exist and continuing functionally active, while the phenomena of inflammation are going on underneath. This would seem to indicate that incidents which are stimulants for the epithelial cells are irritants for the underlying tissues. The discharge may be serous, mucous, mucopurulent, or purulent, according to the intensity of the inflammation, or may go through all four stages.

*Serous Inflammation*.—When serous membranes are attacked, and when the irritation is slight, the exudation approaches the nature of dropsical fluid, and, as it contains very few leucocytes, it does not coagulate. It remains a serous fluid, as, for instance, in hydrothorax and hydrocele.

*Fibrinous Inflammation*.—When the irritant is of an active

kind, the exudation resembles the plasma of the blood, and contains many leucocytes. Hence it tends to coagulate, and fibrin is deposited on the inflamed surface, as in severe cases of peritonitis.

*Productive Inflammation and Adhesive Inflammation.*—These terms are used when a growth of connective tissue is started by and accompanies inflammation. It often brings about an induration known as *Sclerosis*.

*Interstitial Inflammation* exists when the connective tissue between the essential cells of an organ are inflamed. It is usually a chronic process, and often occasions cirrhosis.

*Parenchymatous Inflammation.*—The old meaning of this term was an inflammation affecting the substance of an organ as opposed to that of its lining membrane. At present it implies that the epithelial cells of a part are swollen and granular (cloudy swelling), as in catarrhal nephritis. Other adjectives, such as phlegmonous, suppurative, ulcerative, productive, which do not need explanation, are also in use to distinguish various phases of inflammation.

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### Definition of Inflammation.

In the foregoing cases we have watched “the succession of changes which occurs in a living tissue when it is injured.” We have, in fact, been studying inflammation, for the words between commas are Burdon Saunderson’s definition of that process and the one generally received.

On consideration of what we have seen, the following points become prominent—First, that inflammation is almost non-existent apart from organic irritants. The more you practise aseptic surgery the more this will come out, and you will, for practical purposes, come to look on inflammation as symptoms of a disease due to the presence of organic irritants in a part. Second, that inflammation as at present understood is a broad term, covering both constructive and destructive processes. One is naturally led





to try and separate these processes—viz., that of repair from that of inflammation—but there is the difficulty of defining in many cases what, and how much of, changes going on in an injured part are reparative or the reverse. Take a healthy man run over in the street, and admitted with a severe lacerated wound, which proceeds to recovery by the shortest route known to us. The incidents of such a process one would say ought to be considered incidents of repair. What are they? In such cases, as a rule, some portions of tissue have been killed by the injury, and the dirt of the road has been forced into the wounded parts. In addition, therefore, to the healing of the wound, all dead tissues, beyond the capabilities of the absorbents, have to be separated by a process of ulceration, and pathogenic organisms which may have entered with the dirt, and may not have been removable by irrigation and antiseptics, have to be disposed of by the leucocytes, or whatever constitutes the antiseptic power of the body. These actions go to constitute inflammation; heat, redness, pain, and swelling in varying degrees belong to them; at the same time they are essential to repair. There is often no other way of doing what they do. One thus finds oneself unable to draw any satisfactory line between the various incidents following the injury of a part, and compelled to rest contented with the definition given above.

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### **General Rules for the Treatment of Inflammation.**

#### *Local and General.*

*Local.*—1st. Remove the original irritant. The method of so doing must be studied in connection with each case. 2. Give rest to the part by suitable position, bandages, splints &c., and by putting it out of action as far as possible. 3. Relieve the tension by elevation of parts, pressure or cold to supplying blood vessels, moist hot applications to inflamed area—in some cases by incisions

and blood-letting. 4. Relieve pain by applications containing opium or belladonna.

*General.*—Bearing in mind that, with the removal of the local sources of irritation, the constitutional symptoms will subside, be not over active in combating traumatic fever with general remedies. Secure as far as possible complete repose for mind and body—if necessary, by anodynes, of which the hypodermic injection of morphia is the most valuable. Regulate the bowels. Give fluid nourishment. Help, if necessary, all the excretory organs to do their work—the skin by hot sponging, and hot baths and other diaphoretics; the kidneys by diuretic medicines. Of old it was the custom, when there was high fever, to combat it with what was called *antiphlogistic treatment*. This consisted in general blood-letting, free purgation, the administration of tartar emetic, low diet—in fact, in lowering the system by every means. As, however, inflammation tends to produce great depression of vitality, it is only in rare and special cases that such remedies are allowable. The same remark applies, but in a less degree, to such drugs as antipyrin, antifebrin, salicylic acid and its compounds, &c. They all lower the temperature; but at the cost of depressing the heart's action. They are valuable in certain cases; but not in directly combating inflammation. Of all the febrifuge medicines, quinine is, perhaps, the most valuable. When used in the early stages of inflammation, it is given in large doses (15 to 20 gr.), with the idea that it holds in check the ferments on which inflammation is supposed to depend. Later in the disease it is given in much smaller quantities (gr. 2 to 5), for the sake of its tonic effects. Much reliance, however, is not to be placed on any particular drug in the treatment of inflammatory fever, which, one should never forget, has its origin in some local irritation. Stimulants should be used liberally but carefully as soon as the strength begins to fail, and, in cases where depression is an early symptom, they should be used from the very first. Water should be freely given, for it helps the escape of the waste





material with which the blood is surcharged. When it is rejected by the stomach it should be given by the rectum. Ten ounces (temperature 98·4°) may be injected three or four times a day.

In chronic inflammation, the predisposing causes, as a rule, claim more attention than the local, for it is often hard to define the irritant. It is during its progress that local stimulating treatment by counter-irritants, pressure, massage, douches, &c., comes into play.

## INJURIES OF SOFT PARTS.

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INJURIES of soft parts are divided into contusions and wounds. *Contusions* are subcutaneous injuries from some blunt object. They may be of any degree, from a slight bruise to a crushing that pulpifies the parts. *Symptoms*.—In slight cases there is ecchymosis pain and swelling at the seat of injury. Ecchymosis is a term applied to an effusion of blood into the cellular tissue. It is at first red, but speedily becomes black, and later, in turn, violet, green, and yellow, and disappears about the tenth day. If the effusion is deep-seated discolouration may not appear for a few days, and then, perhaps, at a part remote from the seat of injury. If a large vessel is torn it may lead to the formation of a distinct tumour (hæmatoma), or to a traumatic aneurysm (*vide* p. 124) In severe cases the parts may be pulpified so as to have a gangrenous appearance, but if there is warmth, sensation, and any bullæ that may have formed do not move on pressure, vitality has not been lost.

*Progress*.—Contusions usually run an aseptic course, but if the skin, though unbroken, is injured beyond recovery, then sepsis has to be guarded against as in an open wound.

*Treatment*.—Elevate the part and put it at rest. Apply cold. Keep the skin intact. Later on massage will help absorption. Hæmatomata may be left alone, or if time is important, they may about the second day be incised and the clot turned out.

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## OPEN WOUNDS.

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Divided into incised, lacerated, contused, punctured, poisoned.

*Incised wounds*.—Symptoms: it pains; bleeds; and gapes.





*Treatment.*—Six indications—1. Check bleeding. 2. Cleanse the wound and make it aseptic. 3. Adjust its edges. 4. Drain it. 5. Keep it at rest. 6. Keep it aseptic.

*Contused and lacerated wounds* may be considered as open contusions. There is not much hæmorrhage, as the vessels are either crushed or twisted. Owing to the usually widespread nature of the injury there is danger of suppuration, gangrene, and erysipelas.

*Treatment.*—Same as incised wounds, but with less coaptation, more drainage, and more frequent dressings.

*Punctured wounds.*—More dangerous than they appear. May engage important parts. Edges often bruised. Are difficult to drain.

*Treatment.*—Indications same as in contused wounds. Make a counter-opening if it helps drainage.

*Poisoned wounds.*—These include stings of insects, snake bites, dissecting wounds, and, in fact, every wound that admits a poison or an organic irritant.

*Treatment.*—Tie a ligature above the injured part; eliminate the poison by cleansing, sucking, cupping, free incision or excision, caustics and actual cautery. Give stimulants when necessary.

*The Aseptic and Antiseptic Treatment of Wounds.*—It is not easy to draw a clear line between these two methods of treatment, because an aseptic condition can, as a rule, be arrived at only by the use of antiseptic means. However, at present the adjective aseptic is applied to treatment which busies itself with antiseptic precautions previous to an operation, and does not permit the application of any chemical irritant, such as carbolic acid, corrosive sublimate, &c. (materials which once monopolised the name of “antiseptics”), to the open wound. This method of treatment is applicable chiefly to the wounds made by the surgeon when operating. In the antiseptic treatment, on the other hand, the surgeon does use “antiseptics” for the cleansing of the raw surfaces of the wound. It is chiefly applicable to accidental wounds, for such require active disinfection, inasmuch as organic irritants are presumably present in them.

The *aseptic* treatment of wounds is usually carried out as follows :

1. All instruments, sutures, and ligatures, are sterilised by being boiled for five minutes immediately before the operation in a solution of 1 per cent. of (dried) carbonate of sodium.

2. Gauze sponges—8 layers of butter muslin stitched together at the margin (the usual size, 7 by 7 inches)—swabs—one square foot of butter muslin—gauze dressings, towels, &c., in a word everything likely to come in contact with the wound and capable of being sterilised by heat, is placed in a steam steriliser for one hour at boiling point.

3. The skin of the region to be operated on is thoroughly scrubbed with soap and very hot water, then after ether has been rubbed in it is washed down with corrosive sublimate solution, 1 in 1,000, and finally gauze wet with this solution is laid over the part and left there till the surgeon is on the point of operating.

4. The hands of all taking any part in the operation are sterilised as follows :—

1. Pare and cleanse nails with scissors. 2. Soften hands with a lather of soap, then scrub thoroughly with soap and hot water, paying special attention to folds of skin and nails, and using aseptic nail brush. 3. Immerse hands for two minutes in corrosive sublimate solution (1 in 500), made tepid by an equal quantity of sterilised water, and leave them wet.

The *antiseptic* treatment of wounds includes all the foregoing steps, and, in addition, the irrigation of the wound with a solution of carbolic acid, corrosive sublimate, or anything capable of sterilising such irritant organisms as may have found a lodgment. The amount of irrigation and the strength of the solutions depend on the nature and degree of the defilement. It will be sufficient to wash a simple wound, such as one might receive from a bread-knife, with a 1 in 2,000 solution of corrosive sublimate. Whereas for a punctured wound made with a dirty instrument it would be proper treatment to enlarge it; to cleanse it by washing and scrubbing as far as possible; to irrigate every corner of it with a 1 in 20





solution of carbolic acid, or a 1 in a 1,000 solution of corrosive sublimate, or even in some instances to apply pure carbolic acid to the raw surfaces.

### BURNS AND SCALDS.

The six degrees of Dupuytren are:—1st. Simple erythema. 2nd. Vesication. 3rd. Partial destruction of true skin (very painful; leaves a movable cicatrix). 4th. Total destruction of true skin (deformity results). 5th. Destruction of superficial muscles. 6th. Charring of the whole limb. In most severe burns the first four degrees are found associated.

*Local effects.*—Acute pain and changes in the burned part, varying with each degree.

*Constitutional effects.*—Three stages, any of which may prove fatal—1st. Shock with congestion of internal organs. 2nd. Reaction with inflammation, local and general, commences within forty-eight hours. 3rd. Separation of sloughs with exhaustion from suppuration, and perhaps hæmorrhage about fourteenth day.

*Complications.*—Inflammation of lung, pleura, peritoneum, brain and its meninges, Curling's ulcer (tenth day), hectic, erysipelas, pyæmia, tetanus.

*Prognosis.*—Serious, in proportion to superficial extent burned, also if burn is situated over important organs and if subject is at either extreme of life.

*Treatment, local.*—Remove clothing carefully, cleanse gently, dress with a mild antiseptic, such as boric ointment, and protect from cold with salicylic wool. Avoid exposure, and frequent dressings previous to suppuration. If dressings stick immerse part or body generally in hot boric solution, ten drachms to the gallon.

*Constitutional.*—At first with hot blankets and hot bath promote reaction, giving stimulants guardedly and opium freely. Subsequently support patient's strength and treat complications on general principles, as if occurring independently.

## FROST-BITE AND CHILBLAIN.

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Reaction after exposure to cold may go on to inflammation, and even to gangrene. Treatment.—The circulation of a frost-bitten part must be restored with greatest caution by means of friction with snow, or other cold soft substance. Sloughs and sores resulting must be treated as if caused by a burn.

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## HÆMORRHAGE.

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Hæmorrhages are classified, *anatomically*, as—1, Arterial; 2, Venous; 3, Capillary. Scarlet blood in jets indicates arterial hæmorrhage; dark blood welling up, venous; a general oozing, capillary.

*Clinically*, as—1st. Primary, immediately following injury. 2nd. Reactionary or intermediary (within 24 hours). 3rd. Secondary after 24 hours, due to (a), sepsis; (b), badly applied ligature; (c), disease of vessels; (d), constitutional diseases.

*Effects of Hæmorrhage.*—When in an adult a quantity of blood equal to about five pounds is lost suddenly death takes place at once. When a lesser but still large amount is suddenly withdrawn general pallor and coldness become very evident; there is restlessness and want of breath; the inspirations become deep, and there is a tendency to their rising at regular intervals to a climax, and then subsiding (Cheyne-Stokes' breathing). At the same time there is a feeling of giddiness, and a tendency to syncope if the individual attempts to rise. Thirst, perspiration, failure of voice and sight, dilatation of the pupils, and in the latter stages restlessness and convulsions are also notable phenomena. After abundant hæmorrhages the pulse is rapid, large and dicrotic. Children bear loss of blood badly, infants very badly, but both recover quickly. In old people the reverse is the case, they bear the loss fairly well at the time, but it leaves its mark.





*Treatment.*—The following measures are in use in dealing with the general effects of hæmorrhage in extreme cases. Recumbent position, head low, limbs raised; limitation of circulation of blood to trunk and head by application of Esmarch's bandages to extremities; transfusion of blood or of saline solution, *i.e.*, a drachm of common salt to a pint of sterilised water, temp. 105°, or the injection of the same solution into the rectum, into the cellular tissue, or into the peritoneal cavity when that is feasible.

The natural arrest of arterial hæmorrhage is brought about by the contraction and retraction within its sheath of the cut ends of the vessel, by the enfeeblement of the circulation, by the increased coagulability of the blood, and by the formation of an *external clot* in the sheath and of an *internal clot* inside the vessel itself as far as the first collateral branch. (These clots subsequently become replaced by the growth of cells from the injured walls of the vessel, as happens in the repair of other tissues.) Retraction can only occur in an artery that is completely cut across, hence hæmorrhage from a vessel partially divided is slow in ceasing, especially if the wound is transverse. The formation of the clot is helped by diminution in the force of the heart's action consequent on loss of blood, and by the fact that the coagulability of the blood increases as it flows.

*Surgical Treatment* of Hæmorrhage comes under the following heads:—1, Ligature; 2, Position; 3, Direct pressure by finger or compress; 4, Pressure by finger, tourniquet, or Esmarch's apparatus, between the wound and the heart; 5, Forcible flexion; 6, Cold; 7, Hot water, 130°; 8, Chemical styptics; 9, Caution; 10, Torsion; 11, Forcible pressure; 12, Acupressure. Ligature is best applied at the bleeding point, and to both ends of the vessel if it be completely cut across, or on both sides of the aperture in it if it be only partially divided.

*Treatment of Venous and Capillary Hæmorrhage.*—Position, heat, cold, pressure. A small slit in a large vein may be closed with suture, otherwise large veins if they bleed must be ligatured.

*Treatment of Secondary Hæmorrhage.*—Even when secondary hæmorrhage has ceased before the surgeon's arrival, operative interference is necessary to prevent its recurrence, and this interference should, if possible, be applied at the bleeding point. If it is from a stump, and the bleeding points are small, pressure, ligature, or the actual cautery should be tried; if from the main artery ligature at the bleeding points, the artery being followed up in its sheath till a sound point is reached; ligature at a point nearer heart; and amputation are the choices. The first measure should always be adopted when possible; the second measure should be employed for vessels of the upper extremity and neck, and when the first has failed or is not practicable; the third is often the only safe course in the lower extremity, as gangrene very often follows ligature of the main artery above the wound.

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## FRACTURE.

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THE causes of fracture are predisposing and exciting.

1st. *Predisposing*.—Shape and position of bone; age; sex; pregnancy. Also various pathological conditions, such as mollities ossium, atrophy, malignant disease, scurvy, tabes dorsalis, &c.

2nd. *Exciting*.—External violence and muscular action. The former may be direct or indirect.

*Classification*.—As regards the soft parts, simple and compound (a most important clinical division). As regards the line of fracture, transverse, oblique, longitudinal or stellate. As regards the position of fragments, impacted, non-impacted, depressed. As regards extent, complete and incomplete. Complete may be single, multiple, comminuted. Incomplete may be green-stick, fissured, perforated, splintered.

*Symptoms*.—Crack felt or heard during production; crepitus; shortening and angular deformity; diminished active and increased passive mobility. Moreover, there will be shock, pain, swelling, and, perhaps, locally ecchymosis. Crepitus, the most reliable of symptoms, will be absent when there is impaction, and must be distinguished from its false varieties—viz., sanguineous, arthritic, bursal, tendinous, rheumatic, emphysematous. The degree of shortening will depend on whether the fracture is oblique or transverse, and on the state of the periosteum. To distinguish a fracture from a dislocation, remember in the one there is crepitus, in the other there is none. In one passive mobility is increased, in the other diminished. In one reduction is easy and temporary, in the other difficult and permanent. In one there is shortening, in the other often lengthening.

The application of photography by Roentgen rays to surgery has greatly facilitated the diagnosis of fractures and dislocations, as the exact position of the bones can by this means be ascertained.

*Mode of Union.*—Similar to that which occurs in soft parts. The cells of the periosteum, medullary membrane, and surrounding tissues proliferate, and develop into bone and fibrous tissue.

The callus uniting the fragments is spoken of as temporary and permanent. The temporary partly ensheaths the bone like a ferule, and partly extends up and down the medullary canal like a peg. When the fragments have been thus fixed, the permanent callus is developed between them, and when it is sufficient the temporary is absorbed.

*Treatment.*—The indications are to reduce the deformity, and then to keep the fragments in their proper position till union has taken place. This is done by means of splints and bandages so applied as to bring extension and counter-extension to bear on the fragments, and at the same time to adjust them to one another, while the offending muscles are relaxed as far 'as possible by position. Chloroform, especially in children, helps greatly diagnosis and treatment. When union has taken place, massage and passive movement assist in re-establishing the use of the part.

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## UNUNITED FRACTURE AND FALSE JOINT.

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False joint is a variety of ununited fracture in which the ends of the fragments are rounded off and enclosed in a capsule of fibrous tissue.

*Causes.*—Constitutional: Everything that interferes with the general health, especially such diseases as predispose to fracture. Local: Want of rest, and bad apposition and interference with nutrition of fractured parts. In compound fractures, sepsis and necrosis.





*Treatment.*—1st. Correct constitutional and local causes as far as possible. Rub ends of bone together, and try subsequent fixation. These failing, decide between permanent fixation with a surgical appliance and the following operative procedures:—1. Passing a tenotome between the ends of the fragments and scraping them subcutaneously. 2. Exposing ends of fragments, freshening them, and suturing or pegging them together. When in the forearm or leg a portion of one bone has been shot away—styled a dissecting fracture—it may be necessary to resect the uninjured bone to bring about union. There are instances of gaps being satisfactorily closed by grafting of bone.

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## COMPLICATIONS OF FRACTURES.

The end of a fractured bone may injure blood vessels, nerves, viscera, muscles, &c., in its neighbourhood, giving rise to traumatic aneurysm, gangrene, paralysis and inflammation of injured parts. A peculiar complication is *fat embolism*. It may come on 24 hours after the injury. Capillaries and terminal arteries in the lungs, brain, and elsewhere are found plugged with liquid fat, set free owing to crushing of the medulla and forced into the circulation by the pressure of extravasated blood and inflammatory effusion. Such complication may attend other injuries beside fracture. Sometimes, but rarely, it causes death.

Fracture of the femur, inasmuch as it enforces a fixed recumbent position, often gives rise to bed-sores, and in old people to hypos-tatic pulmonary congestion.

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## COMPOUND FRACTURE.

A compound fracture is one in communication with a wound, and, therefore, open to direct infection.

*Causes.*—May be due to original injury, to subsequent protrusion of bone, or to ulceration or sloughing of skin.

*Dangers.*—1st, injury usually severe, hence likelihood of shock, and complications common to fractures in general. 2nd, many conditions favourable to sepsis are present. The question of amputation therefore arises, as, if necessary, it is best done immediately. It must be taken into consideration when there is much laceration of soft parts and comminution of bone, when large vessels have been wounded, when a large joint is engaged, when nerves are so injured as to leave a useless limb. The age, general condition of patient, and whether the injury affects an upper or lower extremity are important considerations.

*Treatment.*—If wound is small and probably not infected an attempt to close it with a scab of iodoform or collodion may be made; if this fail, or wound, from size or pollution, does not permit of this treatment, then—1st, cleanse thoroughly with carbolic, 1 in 40, without injecting it amongst sound tissue; 2nd, drain, enlarging wound and making counter-openings when necessary; 3rd, fix part in good position; 4th, apply antiseptic dressing, and do so independently of splint, so that it can be removed with minimum amount of disturbance of limb.

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## SPECIAL FRACTURES.

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### FRACTURES OF NASAL BONES, JAW, SCAPULA.

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**Nasal Bones.**—These are liable to be depressed; they should be put back in their place by pressure from within the nostril. A dressing forceps is useful for the purpose.

**Lower Jaw.**—The most usual situation of fracture is close to one of the eye-teeth. These fractures are almost necessarily compound. In addition to the usual symptoms of fracture, inequality, and looseness of teeth, and laceration of gums at the suspected point, together with crepitus heard best by the patient will help diagnosis.

**Treatment.**—A gutta-percha splint is moulded to the part, and secured by a four-tailed bandage; or, in bad cases, the bones are drilled and wired together. Loose teeth should be replaced, especially should one have slipped between the fragments. All talking is prohibited, and the patient fed on fluid nourishment passed through any gap in the teeth or behind the last molar. Four or five weeks are required for union.

**Scapula.**—The body may be broken by great direct violence. It is indicated by pain on movement and crepitus. Apply a broad roller so as to fix a flat pad to the seat of fracture and the arm to the side.

The acromion may be broken at any point from its base to its tip. The finger passed along the spine of the scapula detects the injury, which is further indicated by impaired action of the deltoid. Keep the elbow well supported, and fix the arm to the side.

Fracture of the neck of the scapula resembles dislocation of humerus into axilla, but the deformity is removed, and crepitus elicited on the elbow being pressed upwards. Treatment same as for fractured acromion.

The coracoid process, when broken, is best treated by bandaging the hand of the injured side towards the opposite shoulder, so as to relax the biceps and coraco-brachialis. In all fractures in the vicinity of the shoulder joint it is well to protect the parts by a cap of poroplastic felt or gutta-percha.

## FRACTURES OF CLAVICLE.

An oblique fracture about the centre, caused by indirect violence, is what one oftenest meets with.

*Symptoms.*—The patient comes leaning his head to the affected side and supporting his elbow. At the seat of fracture the end of the sternal fragment appears elevated and projected, because the other fragment is, by the weight of the arm and muscular contraction, carried downwards, inwards, and backwards. When the fracture is situated between the fasciculi of the coraco-clavicular ligament, there is little or no displacement.

*Treatment.*—The indications are to elevate the shoulder and to carry it backwards and outwards. These are attempted by Sayre's method; by the pad in the axilla; Ellis' crutch; Symes' three handkerchiefs; plaster-of-Paris bandage; and dorsal recumbent position. The period of union is four weeks.

## FRACTURES OF HUMERUS.

Of the Upper End.—The following kinds of fracture are met with, all due, as a rule, to direct violence—viz., fracture of the anatomical neck (simple and impacted); of the surgical neck (simple and impacted); and of the great tuberosity. Separation of the epiphysis from the shaft may also occur in patients under twenty.

Fracture of Anatomical Neck.—A rare fracture, mainly intra-capsular. When impacted, the head is generally driven in between the tuberosities.

*Symptoms.*—Signs of severe injury of joint, causing paralysis





and swelling, and absence of signs of other fractures and of dislocation. There is slight shortening (one-third inch), and when no impaction, crepitus.

**Fracture of Surgical Neck.**—A frequent accident. It is extra-capsular, the bone being broken below the tuberosities, but above the insertion of the muscles going to the shaft.

*Signs.*—While the head of the humerus can be felt in its proper place, the end of the lower fragment can be felt in the axilla, or below the coracoid. There is pain, crepitus, and about an inch of shortening. In the impacted variety the shaft is driven between the tuberosities. The signs then, as in most impactions, are of a negative kind. There is slight shortening and thickening.

**Fracture of Great Tuberosity.**—*Signs.*—Increased breadth of shoulder. Tuberosity separated from rest of bone by gap, crepitus on approximation.

**Separation of Upper Epiphysis.**—Resembles extra-capsular fracture, but the age of patient, and the smoothness of the line of fracture and of the crepitus mark the difference.

*Treatment.*—Bandage from fingers upwards. Fix arm to side without supporting elbow. Apply a shield to the shoulder, and a pad in the axilla. Stromeyer's pad is very comfortable for all fractures in this locality. In fracture of the surgical neck carry elbow forwards and inwards. When the tuberosity is broken it must be kept in its place by means of a pad, or the arm may be kept in an extended position on a pillow. The period of union of these fractures is usually five weeks.

**Fracture of the Shaft.**—It may be broken anywhere.

*Symptoms.*—Those usual in fractures.

The following will be the displacements:—When the fracture is between the muscles going to the edges of the bicipital groove and the insertion of the deltoid, the upper fragment will be drawn inwards and the lower upwards; when below the insertion of the deltoid, the upper fragment will be drawn outwards and the lower upwards and inwards.

Complications.—Injury of the musculo-spiral nerve may give rise to “wrist-drop.”

*Treatment.*—A rectangular splint, with three short splints, or a scored splint to humerus. Fix arm to side. Put forearm in sling, but do not support elbow as long as there is shortening.

Of the Lower End.—Four varieties, all, as a rule, due to direct violence—

1. Transverse fracture, usually just above the condyles.
2. T-shaped fracture, being a transverse fracture with a fissure between the condyles making the down stroke of the T.
3. Fracture of either condyle.
4. Separation of the epiphysis.

When examining for these injuries, make patient present both elbows for inspection and comparison, his hands resting on his head.

1. Signs of the transverse.—The lower fragment and forearm are carried backwards, resembling a dislocation, from which, however, it can be distinguished by the usual indications, and by observing that the relations of the condyles to the olecranon is undisturbed, and that the prominence of the upper fragment in front is above the crease of the elbow.

2. Signs of the T-shaped.—Like the transverse, but the condyles are separately movable, and are more apart.

3. Signs of fracture of the condyles.—Manipulation and movement give crepitus.

4. Signs of separation of the epiphysis.—Like transverse fracture, but the crepitus is softer, and the patient young (under twenty-one).

*Treatment.*—Apply an angular splint to the anterior aspect of the limb. Cold to the joint. Forearm in a sling.

Period of union, four to five weeks. The movements of the joint are often impaired. Begin massage and passive movement at end of fourth week.

## FRACTURES OF ULNA.

Three varieties—1. Of Olecranon. 2. Of Coronoid process.  
3. Of Shaft.

1. The olecranon may be fractured by direct or by muscular violence.

*Sign.*—Upper fragment displaced by triceps.

*Treatment.*—Maintain, by means of an anterior splint, a position a little short of complete extension. Bring down fragment by strapping. Antiseptic suture in some cases.

2. Fracture of Coronoid Process.—A complication of dislocation of the elbow, to be suspected when the dislocation recurs on being reduced.

*Treatment.*—An inside angular splint.

3. Fracture of the Shaft.—Direct violence may cause a fracture of the shaft at any point.

*Sign.*—The pronator quadratus approximates the lower fragment to the radius.

*Treatment.*—An interosseous pad and a broad anterior and posterior splint. Forearm midway between supination and pronation.

## FRACTURES OF RADIUS.

Three varieties—1. Of neck. 2. Of shaft. 3. Of lower end.

1. When the neck is fractured, rotation of the forearm elicits crepitus, and is accompanied with little or no movement of head of radius.

*Treatment.*—Fix the arm supine, the elbow flexed at a right angle by means of a palmar splint to the forearm and a dorsal rectangular splint to the arm and forearm.

2. The shaft may be fractured alone (usually indirect violence), or in conjunction with the ulna (usually direct violence). In the latter cases the position of the fragments varies with the direction of the force.

*Treatment.*—Two flat, wide splints, with or without an interosseous pad, leaving the fingers free, and the forearm midway between pronation and supination. If the fracture is above the insertion of the pronator radii teres, treat as in fracture of neck of radius. Inspect parts frequently, as gangrene from pressure is liable to occur. When green-stick fracture, which is not uncommon, occurs, it may be necessary to complete the break in order to get good position.

3. Fracture of the lower end is commonly called *Colles's Fracture*. Colles's fracture is a very frequent injury, especially in old women. It runs transversely, about an inch or three-quarters of an inch above the carpal end of radius.

*Causes.*—Falls on the palm of hand.

*Signs.*—Just above the joint on the dorsal aspect there is a prominence and a depression, while in the corresponding position on the palmar side there is a depression and a prominence. This gives the part a spoon-shaped appearance, and the surgeon, at first, the impression that the carpus is dislocated backwards. The prominence behind is due to the lower fragment, together with the carpus, being displaced backwards and upwards, while that in front is due to a projection forwards of the flexor tendons by the lower end of the upper fragment. It is distinguished from a dislocation by the usual signs, and by the position of the styloid process of the radius, which, in cases of fracture, will be found displaced backwards and upwards, and, if fracture not impacted, to move with the carpus.

*Treatment.*—Reduce deformity, to do which it is well, in some cases, to bend back the hand and wrist before applying extension and counter-extension. Apply either Carr's, Nélaton's, or Gordon's splint, or a long, straight posterior, and a short anterior splint. Avoid prolonged fixation of wrist and fingers. Leave off all apparatus after four or five weeks, and use massage.

Fractures of the carpus, metacarpus, and phalanges are usually due to direct violence. They require no special mention.

## FRACTURES OF THE PELVIS.

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*Causes.*—Direct violence—such as a crush by a cart-wheel—except in the case of the acetabulum, which may be broken by force transmitted through the femur.

*Varieties.*—The line of fracture may be one that will practically detach one os innominatum going close to its articulations in front and behind, or it may engage the sacrum, the coccyx, one of the prominences, or the acetabulum. As regards the acetabulum, the upper or back part of the rim may be broken off in dislocations on to the dorsum, or the head of the femur may be driven into the pelvis through the acetabulum.

*Signs.*—Those usual to fractures in general, and there may also be indications of injury to organs within the pelvis. A digital examination through vagina or rectum may give evidence of displacement, and the passage of a catheter may also give information.

*Treatment.*—A broad supporting band of flannel or poroplastic felt when the fracture is through the pelvis. When the acetabulum is engaged, such appliances as are used for fracture of the neck of the femur should be availed of.

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## FRACTURES OF THE FEMUR

May be divided into those of—1. The Upper End. 2. The Shaft. 3. The Lower End.

1. Fractures of the Upper End.—Three sub-divisions—viz ,  
(a). Intra-capsular fracture of the neck. (b). Extra-capsular fracture of the neck. (c). Fracture of the great trochanter.

(a). Intra-capsular fracture of the neck of the femur may be either non-impacted or impacted. The former is far the more common.

**Non-Impacted Intra-Capsular Fracture.** — *Causes.* — Predisposing—Atrophy, and lessened obliquity of neck due to old age. Exciting—Slight indirect violence, such as missing a step, slipping off kerb-stones, catching the toes in the carpet.

*Signs.*—1. Loss of power—patient cannot raise limb from bed. 2. Trochanter less prominent. 3. Moves in smaller circle. 4. Pain. 5. Crepitus on movement. 6. Position of limb everted and semi-flexed. 7. Shortening,  $\frac{1}{2}$  to 1 inch at first. If capsule gives way,  $2\frac{1}{2}$  inches (measure by Nélaton's and Bryant's line (*vide* p. 90); or from anterior superior spinous process to inner malleolus).

*Diagnosis.*—It may be confounded with a mere contusion, with chronic rheumatic arthritis, with extra-capsular fracture, and with dislocation. The signs already given will, as a rule, distinguish it. Absorption of the neck of femur may in old people result from a mere contusion.

*Prognosis.*—Unfavourable. Death sometimes results from hypostatic pneumonia, and bed sores. Osseous union is rare.

*Treatment.*—Rest in bed for a few weeks, then leather, poroplastic, or Thomas's splint, and gradual use on crutches. In some promising cases Liston's splint may be tried tentatively.

*Impacted intra-capsular fracture* is a rare accident. The neck is driven into the head, diagnosis is difficult, as there is but little shortening, only slight eversion, no crepitus, and the patient may be able to move the limb. It resembles impacted extra-capsular fracture, and the treatment is the same.

(b). Extra-capsular fracture, though more common in the old than in the young, is not, like intra-capsular fracture, a special disease of old age. It may be unimpacted or impacted, and whereas in intra-capsular fracture impaction is the exception, here it is the rule. The impaction consists in the neck being driven into the trochanter, or perhaps it would be more correct to say, in the great trochanter being crushed on to the neck, the anterior wall of which is very thick and strong towards its under surface.





*Causes.*—Direct violence applied to the great trochanter, as a fall on the hip when skating.

*Signs.*—When not impacted, same as in unimpacted intra-capsular fracture, but the injury being more superficial and due to direct violence, there is more evidence of it—such as ecchymosis, bruising, swelling, &c. The shortening is greater, being from  $1\frac{1}{2}$  to 3 inches, crepitus is more readily felt, and there is thickening of the trochanter.

*Signs when impacted.*—There is no crepitus, only a little shortening (1 inch) and a little eversion, and patient can sometimes lift limb from bed; but tenderness, the history of the case, together with thickening, flattening, and perhaps fissuring of the great trochanter, will indicate that that prominence has been driven in upon the neck. Between impacted extra- and impacted intra-capsular fracture there is a great similarity; the condition of the great trochanter, the age of the patient, and the nature of the exciting cause, furnish means of distinguishing them.

*Treatment.*—Same as for fracture of shaft of femur, but when there is impaction extension is not employed.

(c). Fracture of great trochanter is a rare injury, easily diagnosed by the separation between the fragments. It requires no special mention.

2. Fractures of the Shaft.—Common in children; less common in adults; rare in old people; classified as of upper, middle, or lower third.

*Signs.*—Those usual to fractures in general; a consideration of the muscular attachment, and the position of the fracture will indicate the displacements. Those affecting treatment are, at the upper end, the tilting forward of the upper fragment by the psoas and iliacus; at the lower end the tilting backwards of the lower fragment by the gastrocnemius. At times these displacements can be overcome only by flexion of the thigh and the leg respectively. Treatment—(1) Liston's splint; (2) double inclined plain; (3) weight and pulley; (4) Hamilton's splint; (5) Bryant's splint; (6) Hodgens' splint; (7) plaster-of-Paris and starch bandages.

3. Fractures of the lower end.—Five varieties, viz., (a) Transverse ; (b) T-shaped ; (c) engaging one or other condyle ; (d) shaft impacted between condyles ; (e) separation of epiphysis.

*Signs.*—Nothing special except the already referred to backward displacement of lower fragment in the supra-condyloid fracture.

*Treatment.*—The deformity just mentioned may require division of the tendo-Achilles, or the use of the double-inclined plain. Other varieties may be let rest in a M'Intyre's or Thomas's splint till swelling subsides and then secured in a plaster-of-Paris bandage. Period of union in fracture of femur, seven to eight weeks for adults.

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## FRACTURES OF THE PATELLA.

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Common to men in middle life.

*Causes.*—Muscular or direct violence.

*Varieties.*—Transverse, when due to muscular action ; vertical or starred, when produced by a direct injury.

*Signs.*—In the transverse fracture there is a marked separation of the fragments ; in the vertical there is none. The patient cannot stand or extend his leg.

*Mode of Union.*—Ligamentous in transverse variety, unless the fragments are sutured ; bony in the vertical.

*Treatment.*—First get rid of fluid in joint by rest on a posterior splint, together with cold lotions or aspiration. Then approximate fragments by position, putting the patient semi-recumbent and the leg elevated, and by any of the following appliances:—1. A straight back splint, supplemented by pads, strappings and bandages, applied in various ways, to pull upper fragment downwards and lower upwards. 2. Malgaigne's hooks. 3. Plaster-of-Paris bandage. 4. Thomas's splint and elastic bandage.

Operative procedures, the chief of which consists in exposing by a vertical incision the seat of fracture and uniting the fragments by a wire suture, yield the best results.









## FRACTURES OF THE TIBIA AND FIBULA.

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Fracture of both Bones.—Causes—Direct or indirect violence. Direct violence breaks the bones transversely at the point where it is applied, while to indirect violence they usually give way obliquely, the tibia about the junction of the lower with the middle third; the fibula in its upper third. In the transverse there is little or no displacement; in the oblique, the sharp end of the upper fragment projects forward, sometimes making the fracture compound.

Fracture of the Tibia alone occurs usually at the part most exposed to injury—the lower third—by direct violence.

Fracture of the Fibula alone is common about two or three inches above ankle, with rupture of internal lateral ligament and dislocation of foot outwards, and slightly backwards. It is known as *Potts' fracture*.

*Treatment*.—If much swelling, place limb on a back splint—such as M'Intyre's—and apply cold lotion. When swelling has subsided, or at first if there is no swelling, put up in plaster-of-Paris, or in Cline's splints, and then sling the limb in a Salter's cradle. For Potts' fracture Dupuytren's splint is often used.

Fractures of the bones of foot have nothing special about them, except that they are usually due to direct violence. Bones much crushed may require removal.

Fracture of Ribs (see page 203.)

## DISLOCATIONS.

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A JOINT is said to be dislocated when the articular end of one of the bones forming it is out of place. It may be complete or partial, simple or compound, traumatic, pathological or congenital.

*Causes.*—External force, direct or indirect, and muscular action.

*Signs.*—1. Pain and discomfort. 2. Diminished active and passive motion. 3. Deformity, including every change of shape and relations of parts to one another due to the displacement.

*Diagnosis.*—May be confounded with fractures in the neighbourhood of joint, and with sprains and contusions (*vide* Fractures, p. 69).

*Impediments to Reduction.*—1. Contraction of muscles. 2. Interposition of ligaments, tendons, or of capsule when the rent is small. 3. Bone hitching in neighbouring processes. To these may be added, in old cases, adhesions and obliterations of the socket.

*Treatment.*—Replace bone by manipulation or extension as soon as possible, and keep it in its place till the injured parts have recovered.

*Dangers Attending Forcible Reduction.*—Vessels, nerves, and other tissues may be injured, bones may be broken, or even the limb torn off.





## DISLOCATION OF THE LOWER JAW.

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Usually bilateral.

*Causes.*—Muscular action or direct violence during over-extension in gaping.

*Symptoms.*—Mouth widely open; cannot be closed. Saliva dribbles away. Condyles found displaced under malar bone, and their sockets empty. In the unilateral variety only one socket is empty, and the chin inclines to sound side.

*Treatment.*—Place thumbs, well wrapped up, on last molar teeth, and make downward pressure, while with the rest of the hand the symphysis is raised. As soon as the condyles are clear of the articular eminence, the muscles will complete the reduction. Limit movements with a four-tailed bandage for a few weeks.

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## DISLOCATIONS OF THE CLAVICLE.

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*At the Sternal End.*—1 Forwards 2. Backwards. 3. Upwards.

*Treatment.*—Draw back shoulders, and keep them so. Apply pad when indicated.

*At the Acromial End.*—1. Upwards. 2. Downwards (rare).

*Treatment.*—Support elbow while the shoulder is drawn back and downward pressure applied on the dislocated end of bone. Apply a poroplastic felt 'gap,' or plaster-of-Paris bandage going over shoulder and under elbow, and fixing arm to side.

## DISLOCATIONS OF THE SHOULDER.

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Of all dislocations the most common.

*Causes.*—Blows on shoulder, or on hand when arm extended above head.

*Varieties*, five—1. Sub-coracoid. 2. Sub-clavicular. 3. Sub-glenoid. 4. Sub-spinous. 5. Supracoracoid.

*Signs.*—1. Those common to all dislocations. 2. Those indicating the position of the head of the bone—viz., (a). Head of bone in abnormal position. (b). Flattening of shoulder. (c). Acromion prominent, and beneath it an empty glenoid cavity. (d). Axis of humerus changed.

*Tests showing Dislocation.*—If the hand is on the opposite shoulder, the elbow cannot be made to touch the chest, and *vice versa*. 2. Measurements. A tape passed round injured arm and chest, a few inches above the nipples, measures less, and a tape passed from axilla round acromion on injured side measures more, than similar measurements on sound side. 3. A straight edge can be made to touch the acromion and the external condyle at one and the same time. 4. When elbow is pressed to side there is no room in the axilla. A consideration of the anatomical relations indicated by the name of each variety of dislocation will give the special signs of each.

*Diagnosis.*—From fractures in the neighbourhood (*vide* Fractures, p. 69), and from paralysis of the deltoid.

*Treatment.*—1. The heel in axilla. 2. The knee in axilla. 3. Elevation of limb. 4. Manipulation as follows:—Seat the patient; flex the elbow to a right angle, and press it to the chest, then rotate outwards, and when distinct resistance is met with, the elbow must be raised forwards and inwards (rotation outwards being still maintained), till it is at right angles with the body,





finally the hand is placed over the opposite shoulder. After reduction, the arm should be fixed to side for a fortnight, and motions limited for another fortnight.

*Old Dislocations.*—The limit of time for attempting reduction is three months; but cases have been successfully dealt with at much later periods (*vide Dangers Attending Reduction*, p. 84). *Treatment.*—In such cases, as a rule, old adhesions must be broken down, and pulleys will be required; or extension and counter-extension may be used in bed by means of a weight; or the patient may be suspended by the arm for a time before reduction is attempted.

In all old cases, and in most others except very recent ones, anæsthetic will be required.

## DISLOCATIONS OF THE ELBOW.

Frequent in boys, due to indirect and direct violence.

*Varieties.*—*Both Bones*—1. Backwards. 2. Forwards. 3. Inwards. 4. Outwards. 5. Ulna backwards and radius forwards.

*Ulna alone.*—1. Backwards.

*Radius alone.*—1. Forwards. 2. Backwards. 3. Outwards. 4. Partial.

Of these varieties, the dislocation of both bones backwards, and of the radius forwards or outwards, are the commonest. Others very rare.

*Diagnosis.*—See if any fractures exist (*vide* p. 76). Make patient present both elbows together for inspection and comparison, his hands resting on his head. Note the relative position of the olecranon to the condyles. If it is not in its place, differentiate and measure the displacement, contrasting it with the triangle of the opposite elbow, and looking out for signs of dislocation, remem-

bering that displacement backwards is accompanied by flexion and slight supination of forearm unless freedom is given by a fracture of coronoid—a rare occurrence. If it is in its place, there is no dislocation of ulna, so proceed to examine radius. See if the head of that bone rotates in its proper place, and if the axis of the bone is correct. If it is displaced forward, the most usual accident, the elbow will be somewhat flexed, and midway between pronation and supination. The positions of the ends of the bones will indicate the other displacements, except that known as subluxation, or partial dislocation of radius, caused in children by a jerking forward of the hand. In these cases flexion and supination are limited, without apparent cause, but on their being forced the bone, as a rule, goes into its place.

*Treatment.*—For dislocations of ulna, or both bones backwards, put pressure on forearm by means of knee placed in bend of elbow, and so unlock bones and allow the muscles to replace them. For dislocations of radius alone, make extension from the hand, and replace head of bone by direct pressure upon it. Keep arm on a splint for a fortnight. Six weeks is the period, after injury, during which you may try reduction.

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### DISLOCATION OF LOWER END OF RADIUS FROM ULNA.

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A rare occurrence. May be forwards or backwards. It is returned by extension and pressure.

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### DISLOCATION OF WRIST.

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May be forwards or backwards. The latter resembles a Colles' Fracture (*vide* p. 78). Both varieties are rare, and may be reduced by extension and pressure.

Dislocations of the carpal and metacarpal bones are obvious and rare.





## DISLOCATIONS OF THUMB AND FINGERS.

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The following are the most important :

Metacarpo-phalangeal joint of thumb—backwards.

*Signs.*—Thumb shortened, bones relatively displaced, phalanx backwards..

*Treatment.*—Reduction difficult, as the head of the metacarpal bone is lying as if in a button-hole between the two heads of the flexor brevis pollicis muscle. Direct traction will only tighten these round the neck of the bone. Therefore, bend back the first phalanx very fully and so force its end also into the button-hole ; now keeping the bones in apposition and the base of the phalanx well forward by pressure on it, first straighten and then flex the thumb, whereupon both bones will probably escape together backwards out of the constriction. This manipulation failing, the bone may be pulled into place by means of a clove-hitch knot or other appliance attached to it to give more command of the parts. All other means failing, antiseptic division of the obstructing band or resection of the joint may be done.

Dislocations between the phalanges are usually partial and may escape notice.

*Treatment.*—Traction by such an appliance as the toy called the “Indian Puzzle” will set them right.

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## DISLOCATIONS OF THE FEMUR.

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An accident common to young male adults.

*Varieties.*—The most common are the four thus classified by Sir Astley Cooper—1. On to the dorsum ilii. 2. Into the sciatic notch. 3. Into the obturator foramen. 4. On to the pubes. These also constitute the chief “regular” dislocations of Bigelow.

The relative frequency of each variety is fixed by Sir Astley Cooper as follows:—Of twenty cases he gives 12 to No. 1; 5 to No. 2; 2 to No. 3; 1 to No. 4.

*Causes.*—Indirect violence applied when the limb is abducted. In all varieties of dislocation the head of the bone, as a rule, leaves the acetabulum in a downward direction, and the same force that caused it to do so, or a subsequent one, gives it a rotation or flexion that determines its final position. Occasionally the dislocation is primarily upwards during adduction, and is then often accompanied by fracture of the rim of the acetabulum.

*Anatomy.*—The Y ligament of Bigelow and the obturator internus muscle govern the position taken by the dislocated bone. The Y ligament is a thickening of the anterior portion of the capsule, shaped like an inverted Y, attached above to the anterior inferior spine of ilium and below to the upper and lower part of the inter-trochanteric ridge. It bears a strain of from 250 to 750 pounds. Dislocations in which it is ruptured are very rare. They constitute the irregular dislocations of Bigelow, and need not be mentioned here.

1. Dislocation on Dorsum Ilii.—The articular surface of the head of the bone looks backwards, and is above the tendon of the obturator internus.

*Symptoms.*—Movements limited. There is shortening, adduction, rotation inwards, and slight flexion not to be overcome. The great toe rests on the opposite instep, and the axis of thigh is across lower third of opposite thigh. The head of the bone may be felt in its new situation; measurements by Bryant's line and Nélaton's line also indicate its position.

(Nélaton's line—A line drawn from the anterior superior spinous process to the most prominent part of the tuber ischii. When the parts are in normal position it crosses the upper border of the great trochanter. Bryant's line—A line drawn from the upper edge of the great trochanter to meet at right angles a line drawn horizontally around the body on a level with the anterior superior





iliac spines. This is to be measured with a similar line on the other side.)

2. Into the Sciatic Notch.—Resembles the last variety, except that here the head of the bone has slipped below the obturator internus, which checks its ascent on to the dorsum ilii. Symptoms same, but less marked; less shortening, which is, however, increased by flexing limb. The great toe rests on that of opposite foot, and the axis of thigh is across opposite knee.

3. Into the Obturator Foramen.—*Signs*—The body is bent forward, the limb is lengthened, abducted, a little flexed, and the toes point outwards. There is a depression in the place of the trochanter.

4. On to the Pubes.—The articular surface of the head of the bone looks forward. The limb is everted, shortened, abducted, and slightly bent. There is flattening of hip, and the bone can be felt on pubes.

*Treatment*.—Reduction as early as possible, either by manipulation or by traction. For application of either means the patient should be placed on his back on a mattress on the floor, and fully anaesthetised.

*Reduction by Manipulation*.—By this means an attempt is made to make the bone return by the route it took when coming out, at the same time disengaging it from any prominences or tissues that are in the way, and relaxing all opposing ligaments and muscles. In studying the various movements it is well to have at hand a pelvis with a femur attached by a strong band, representing the Y ligament.

In the *reduction of Dorsal and Sciatic Dislocation* Bigelow describes the manœuvre by the words—"Lift up," "bend out," "roll out." The surgeon standing on the injured side grasps the ankle with one hand and the femur or leg with the other. He first flexes and slightly adducts the limb ("lifts up"), then abducts it ("bends it out"). This, probably, moves the head of the bone to the opening in the lower part of the capsule through which it

escaped. He finally, by rotating it outwards ("rolling it out"), and, at the same time, straightening it, rolls the head of the bone into the acetabulum.

In the reduction of the thyroid and pubic varieties the following is the manœuvre:—Flex the limb to a perpendicular position and slightly abduct it, then forcibly rotate inwards, adduct, and straighten. At every movement keep fixed in your mind the relative positions of the head of bone and acetabulum. Remember that the head of the bone looks in the same direction as the internal condyle. Reduction by traction may be done with the limb flexed or straight, and with or without the use of pulleys.

*Reduction by traction in the flexed position* applied to the dorsal and sciatic varieties.—Flex the thigh upon the abdomen, bending the limb at the knee to a right angle; slightly abduct and rotate inwards, and then apply traction in the line of the femur, if necessary steadying pelvis by putting foot on the anterior superior spinous process. In the thyroid variety a similar manœuvre, but with more abduction, is employed. In the pubic variety substitute rotation inwards for traction.

*Reduction by traction in the extended position.*—This is generally made by pulleys in the direction of the axis of the limb, while the pelvis is steadied by means of a perineal band. When the limb is sufficiently extended the head of the bone may be lifted over the edge of the acetabulum and into its place by means of a towel passed round the upper part of thigh.

After reduction the limb should be kept in a Liston's splint without extension for a fortnight, after which passive motion occasionally.





## DISLOCATIONS OF THE PATELLA.

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1. Outwards (most common). 2. Inwards. 3. Edgewise.
4. Upwards, with rupture of ligamentum patella.

*Symptoms.*—Evident.

*Treatment.*—By flexion and manipulation, if necessary under an anæsthetic, try and get parts back into their places. Be slow to divide any obstructing tendons or ligaments. Treat No. 4 variety as you would a fracture of patella.

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## DISLOCATIONS OF KNEE.

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Very rare.

- Varieties.*—1. Backwards. 2. Forwards. 3. Inwards. 4. Outwards.

*Symptoms.*—Evident.

*Treatment.*—Use extension rotation and manipulation as indicated by the position of the parts. 1. Apply a back splint and ice. Later a knee-cap, passive motion, and massage.

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## DISLOCATIONS OF SEMILUNAR CARTILAGES.

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The internal is that most commonly displaced, and usually by a twist while the limb is flexed.

*Symptoms.*—Sudden and severe pain with inability to straighten the limb, followed by some synovitis.

*Treatment.*—Flex the knee completely, rotate it outwards or inwards, according as it is the inner or outer cartilage that is displaced, and then straighten the limb suddenly. The movement is best effected by the patient grasping the foot behind with one or other hand and letting go suddenly.

## DISLOCATIONS OF THE ANKLE.

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Generally accompanied by fracture of fibula or inner malleolus.

1. Outwards; same thing as Potts' fracture (*vide* p. 83). 2. Inwards; inner malleolus fractured. Symptoms and treatment same as Potts' fracture, but in an opposite direction.

3. Forward. Symptoms.—Heel less prominent, tendo-Achilles relaxed.

4. Backward; heel more prominent, tendo-Achilles tense.

*Treatment of 3 and 4 Varieties.*—Flex leg, and by extension and manipulation, while an assistant holds the thigh, get the parts into place. Tenotomy of tendo-Achilles may be necessary. Apply a back splint with ice to joint, afterwards fix with a plaster-of-Paris bandage.

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## DISLOCATIONS OF THE ASTRAGALUS AND OF THE OTHER BONES, OF THE TARSUS, OF THE METATARSAL BONES, AND OF THE PHALANGES.

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These bones may be separated from one another in the various directions, of which the probability and possibility are indicated by their relations.

*Treatment.*—The displaced bones must be pushed or pulled back in their places, while opposing ligaments and muscles are relaxed by position. Afterwards fix with a splint, and apply ice as in other dislocations.

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# SURGICAL DISEASES.

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## INFECTIVE GRANULOMATA.

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TUBERCULOSIS, together with syphilis, glanders and farcy, leprosy, actino-mycosis, and rhino-scleroma are classified by pathologists under this head. The characteristic of the group is the presence of "tumour-like bodies, consisting of granulation tissue, and locally or generally infective."

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## TUBERCULOSIS.

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The disease is due to infection by the tubercle bacillus—a parasitic fungus round at the ends, thin and long (its length 5 times its breadth).

*The causes* may be divided into—1st, whatever helps this germ to enter the body; 2nd, whatever, when it has entered, favours its growth. It is usually disseminated as a spore, being much more indestructible in that form than as a bacillus. It is to be found in the dust of rooms occupied by tuberculous patients, in the milk of cows with tuberculous udders—in fact, in whatever is contaminated with tuberculous discharges. It may enter through the respiratory or digestive tract, or through some breach in the skin. Once entered it may fail to find a suitable soil and be expelled, or it may settle in a particular part.

The condition of body that favours its reception consists in an abnormal vulnerability called the scrofulous or strumous

diathesis. Such may be hereditary, and may be induced and aggravated by malnutrition, insanitary surroundings, damp climate, or a purely vegetable dietary. Two types of this condition are recognised—the coarse or phlegmatic, and the fine or sanguineous. The coarse are usually sallow, greasy, thick-set, and piggish-looking; the fine may be delicately dark or delicately fair. In both, the stomach is found deranged and the extremities cold and clammy.

The local condition that most favours the bacillus is that which results from a slight injury.

The microbe having effected a lodgment, a struggle between it and the cells of the part, of which tubercle is the outcome, ensues. If in the contest thus originated the local cells prevail, there is an end of the disturbance. If the invaders make good their lodgment, they multiply and spread into neighbouring parts, creating grey nodules, and destroying the tissues in which they live. Coincidentally with this progressive infection, a fatty degeneration or caseation of the original nodules takes place, making what is called yellow tubercle. Therefore, in an area where the disease is active, a caseous mass will be found in the centre and grey tubercle at the circumference. To the *naked-eye* it appears at the outset sometimes as an infiltration, usually as grey nodules, hard, round, semi-transparent, about the size of a millet seed. Hence the name "Grey Miliary Tubercle." Around each nodule inflammatory indications will be present—viz., either hyperæmia or granulation tissue; or if a serous surface is engaged, lymph and serum. This combination of tuberculous and inflammatory developments converts some tissues into a soft pulpy mass, studded with grey or yellow tubercles, much resembling frog-spawn in appearance, and known as tuberculous granulation tissue.

*Histologically*, tubercle consists of very fine nodules, each one made up of epithelioid and giant cells surrounded by a layer of white corpuscles. The epithelioid cells are formed by the proliferation of the endothelium of the lymph spaces and small vessels—





the giant cells are supposed to be epithelioid cells hypertrophied. The white corpuscles have, of course, migrated from the blood.

*Yellow Tubercle.*—This degeneration is partly due to the action of the bacillus, partly to malnutrition. It is found that “when- ever the production of cells outstrips the development of blood- vessels, the elements undergo fatty atrophy from slow starvation.” The cheesy mass may become encapsuled, and in this state remain quiescent for some time, the bacilli remaining alive, and capable of activity if set free—or it may dry up, or it may calcify, and finally become absorbed. It may also soften into a curdy fluid resembling pus, and be expelled. These collections are spoken of as *cold abscesses*. Swelling, fluctuation, and the absence of inflammation characterise them. When opened, they easily become invaded by septic organisms, and *hectic* ensues.

*Extension of Tubercle* occurs, first, by continuity of tissue, the white corpuscles taking up and conveying the non-motile bacilli; 2nd, by lymphatics; 3rd, by arteries; 4th, by veins.

*Symptoms.*—Tubercle, till it softens and suppurates, occasions, as a rule, little or no constitutional disturbance; its local symptoms will be best studied in connection with diseases of particular regions.

*Treatment.*—Preventive treatment consists in disinfection as far as possible of everything that may have been contaminated by discharges from infected men or animals, and in the improvement of the health by attention to hygiene. Curative Treatment.—Under this head also hygienic rules are included, together with change to the seaside or to favourable climates, and the use of such drugs as cod-liver oil, extract of malt, iodine and iron. Local treatment should aim at the removal of infected tissues, and will be referred to when dealing with disease of particular parts.

## SYPHILIS.

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A constitutional disease due to the inoculation of a specific virus. The exact nature of the virus is not known. A bacillus has been demonstrated, but has not yet fulfilled the conditions mentioned at page 11. It is divided into Acquired, and Hereditary or Congenital.

*Mode of Communication.*—The specific virus exists in the discharges from all primary and secondary syphilitic affections, and in the blood of persons in whom the disease is active. An important question arises in this connection, viz.—When may a man, who has contracted syphilis, marry? The best authorities say, not earlier than three years after the contraction and treatment by mercury of the primary affection, and one year after the disappearance of any secondary affection. Inoculation usually takes place through an abraded surface.

*Three Stages.*—1st. Primary; 2nd. Secondary; 3rd. Tertiary.

1st.—*Primary Stage.*—The manifestations of this stage are, chancre and enlargement of neighbouring lymphatic glands. After inoculation there is a period of incubation, usually about twenty-five days, and varying from ten days to forty-six. During this period the point of inoculation may heal, or if irritated, may remain raw, or if the virus was contained in the discharge of a local contagious sore, a sore of that kind may become developed, and the true syphilitic sore appear as a continuation of it. The true chancre begins as a growth of indurated tissue, which increases not steadily, but with remissions, underneath the epithelium, or if there is an ulcer, as an induration of its base. When fully developed it is distinguished by being single, and being indurated in varying degrees from a parchment-like infiltration to a thick cup-shaped mass, called the “true Hunterian sore,” that





feels like a lump of cartilage when lifted between the fingers. The surface of the induration is generally abraded, and either dry or covered with a scanty serous discharge. These characters may vary very considerably, for irritation and other circumstances may cause the induration to take on various degrees of ulceration and sloughing. Very soon after the appearance of the chancre there is a multiple enlargement of the neighbouring lymphatic glands. They are very hard, do not tend to suppurate, are not painful or tender, except a little at first, and are slow to disappear.

2nd.—*Secondary Stage*.—Secondary manifestations do not show themselves, as a rule, earlier than nine weeks from inoculation or six weeks from formation of chancre. They are as follows:—

1. Skin eruptions, which may be roseolar, squamous, papular, vesicular, or pustular. They may be intermixed, are generally symmetrical, and are not, as a rule, irritating or itchy.
2. Sore throat, which may appear as a small superficial snail-track on back of pharynx, or as a deep excavated ulcer of tonsils with thick edges and grey surface.
3. Periostitis, causing pains in bones, worse at night and increased by pressure.
4. Moist papules, at the creases of the body, or in the form of mucous tubercles, or condylomata, at junctures of skin and mucous membrane.
5. Iritis, with beads of lymph tending to close up pupil.
6. Enlargement of glands of neck.
7. A general but temporary thinning of hair.

3rd.—*Tertiary Stage*.—On the termination of the secondary symptoms, which may last two months or two years, the disease may totally disappear, or tertiary symptoms may at once show themselves, or there may be a long period of quiescence, which may be undisturbed, or during which the disease may give evidence that it is still in existence by symptoms that are sometimes classed as “intermediary,” such as ulcers on tongue and throat, scaly crescentic patches here and there on body, especially on palms of hands and soles of feet. It is the tertiary stage that gives its very serious character to syphilis. Secondary affections are transitory, and engage chiefly the skin and mucous membrane. Tertiary are

more permanent, more prone to recur, more deeply seated, and may engage parts essential to life. The lesions of this stage, like all syphilitic lesions, are due to localised inflammations of a special kind, producing new connective tissue. Such production may, in some cases, be diffuse, causing a more or less cirrhotic condition of the affected part, and perhaps destruction of its special cells. More commonly it takes the form of a defined tumour, varying in size from a millet seed to a walnut, which rapidly undergoes caseation, and constitutes what is called a gumma. Gummata may form in any part of the body. In appearance they are greyish-yellow masses, with well-defined borders. When situated near the surface they often break down, leaving deep ulcers, with ragged undermined edges; otherwise they are absorbed, leaving scars to mark where they have been. Another lesion of tertiary syphilis is one affecting the arteries. It consists in a great thickening of the inner coat, often causing complete obliteration of the vessel. Such changes are found chiefly in the small arteries of the brain, and in those in the neighbourhood of gummata. This may account for the early degeneration of these tumours. The following are the chief clinical manifestations of syphilis during its tertiary stage:—Periostitis, causing nodes, tender and painful at night; affections of brain and nervous system, causing paralysis epilepsy, external strabismus, ptosis; affections of solid viscera due to gummata, or diffuse fibroid induration; caries and necrosis seen oftenest in bones of nose and palate; rupia, a characteristic skin affection of the third stage, having a conical laminated scab adherent to an ulcerated surface the size of six-pence, and leaving when it heals a circular scar often useful in the diagnosis of less evident syphilitic affections.





## CONGENITAL SYPHILIS.

It is probable that an infant never inherits syphilis without the mother being infected. A fact remarked by Colles proves this—viz., an infant often infects a wet nurse through an abraded nipple, but never its own mother. It manifests itself either at birth or more frequently after a period equal to that of primary incubation—i.e., four or five weeks. It is a much more severe disease than the acquired form, causing deformities, hindering development, and often proving fatal. It seems also to be much more contagious, and during its progress secondary and tertiary symptoms are more often found associated. The following are its chief manifestations:—1. Snuffing, due to superficial ulcerations in the nose, mouth, and throat. This is generally the first symptom to attract attention. 2. Erythematous rash of raw bacon tinge or moist papules on the scrotum, thighs, and buttocks, growing into condylomata at the anus. 3. Enlargement of the testicles. These signs are accompanied with emaciation and cachexia. A little later, say when the child is six or seven years old, the disease having reappeared in its tertiary stage, may be marked by “Hutchinson’s triad” of symptoms, viz.:—1. *Teeth*. There is a single shallow semilunar notch in the permanent upper central incisors, and the teeth generally are “pegged,” i.e., broader at the neck than at the cutting edge. 2. *Eyes*. Interstitial keratitis insidious in its onset and producing opacity of cornea. 3. *Ears*. Deafness due to a non-suppurative thickening in middle ear. In addition, scars, circular and crescentic, about the angle of the mouth and on the palate and throat. A nose depressed at the bridge, but up-tilted at the point; a forehead prominent and broad, and enlargement of the cervical lymphatic glands, may give further evidence of the condition.

*Treatment*.—To the local sore apply any simple dressing that keeps it clean and aseptic, such as boracic lotion, blackwash, or iodoform. The treatment of the constitutional disease resolves

itself into the judicious use of mercury and its judicious continuance, off and on, for years. It may be given by the mouth, by inunction, by fumigation, or by subcutaneous injection. One grain of hyd. c. creta may be taken as a tabloid, or grain  $\frac{1}{16}$  of hyd. perchloride, in solution, after each meal; or, in fact, any preparation of mercury in corresponding small doses. Whatever preparation is used it must be continued for three or four months at the outset, and repeated as occasion requires. Inunction is the best way of administering the drug, when the evident unpleasantness attending its use in this way can be borne with. It may be carried out thus—Mercurial ointment is made up into one drachm packages. First day half a package is well rubbed into each leg from ankle to knee, twenty minutes being expended in doing so. Second day a similar application is made to thighs. Third day to front of trunk. Fourth day to back of trunk. Fifth day to arms. On sixth day, after a warm bath has been taken and all old ointment washed off with soap, the inunction is again applied to legs, and continued as before on subsequent days. If patient keeps his teeth clean, uses an alum mouth wash, and does not keep himself shut up in a close atmosphere, such inunctions may be in most cases continued as long as is necessary. A course of sixty rubbings to begin with, followed by courses of thirty rubbings whenever there is a reappearance of the disease, may be relied on to effect a cure in most cases, if begun sufficiently early. Whether given by the mouth or by inunction, all administration of the drug must be at once stopped if there is any tenderness of the gums or other sign of the patient being salivated. In the tertiary stage iodide of potassium, alone or in conjunction with mercury, is given. In bad cases it is used in large doses, as much as twenty or thirty grains thrice daily.

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## NON-INFECTING VENEREAL SORES.

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*Soft Chancres* are non-infecting sores dependent on a special virus in which, as yet, no specific organism has been found. They are distinguished from true chancres—1st, by their appearing a few days after connection; 2nd, by their being usually multiple; 3rd, by the absence of glandular enlargement, or the presence of one large inflamed gland, instead of the multiple hard infiltration characteristic of syphilis; 4th, by the appearance of the sore. The sore is usually situated at junction of prepuce and glands, somewhat circular in shape, with sharp-cut edges and depressed greyish-purulent surface that cannot be cleansed, and that secretes inoculable pus. A red areola and inflammatory infiltration of the base are often present, but not the sharply-defined cartilaginous setting of syphilis.

Not all soft sores assume these typical characters. Some appear as superficial abrasions, with a velvety fungating surface; others become highly inflamed with a tendency to slough. These latter often induce phimosis, in which case they can only be reached by slitting up the foreskin.

*Phagedænic Chancre* is characterised by a rapid and deeply destructive ulcerative process, dependent apparently on some special poison and not on neglect. It may be “without slough, with white slough, or with black slough.” It is often followed by secondary symptoms.

*Progress.*—The ordinary soft chancre ulcerates for 3 or 4 weeks, and then tends to heal.

*Diagnosis.*—It must not be confounded with herpes, which begins with a crop of vesicles, and does not advance beyond an abrasion.

*Treatment.*—Great cleanliness; iodoform locally, and the interposition of absorbent wool between glands and prepuce. The patient should not go about much, and should support the part with a T bandage.

Phagedænic chancre should be treated like noma.

## GLANDERS AND FARCY.

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These are varieties of an infective disease, due to a specific micro-organism, occasionally communicated to man from horses by inoculation. In glanders the nasal mucous membrane, in farcy the skin is primarily engaged. Period of incubation, two days to two weeks. Characteristic symptoms.—1. A foul purulent discharge from nose with enlargement of sub-maxillary glands. 2. A pustular eruption resembling small-pox. 3. The lymphatic vessels and glands become hard and tender with swellings opposite the valves, called “farcy buds,” which enlarge and ulcerate. The termination and treatment of the disease are the same as in pyæmia.

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## LEPROSY.

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There are two varieties.—*Tubercular*, affecting the skin; *Anæsthetic*, affecting the nerves. They may run concurrently. In the former, patches of hyperæmia are followed by thickening of the skin and the formation of nodules which may reach the size of walnuts; in the latter, swellings form upon nerves, with the result that the parts they supply become pale and wasted and void of sensation, and finally ulcerate and decay. A bacillus resembling that of tubercle seems to cause the disease, which is transmissible, but not highly so. *Treatment*—No effectual remedy has been discovered.

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## ACTINO-MYCOSIS.

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*Actino-mycosis* is an infective disease rarely seen in this country. It is transmitted to man from animals, and depends on a fungus styled actinomycetes or ray fungus, which gives rise to the formation of masses of granulation tissue, studded with small





yellow dots. Symptoms—A tumour, liable to pass as a sarcoma, forms, most commonly, in connection with the lower jaw. It softens and suppurates and spreads very much as does tubercle, which it resembles histologically. *Treatment*—That of tubercle.

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### RHINO-SCLEROMA.

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In this disease, of which little is known outside Vienna, infection by a bacillus leads to the formation of hard plates of new growth, resembling keloid, in the skin and mucous membrane round the anterior nares; thence it spreads and infiltrates all neighbouring parts. It is very slow in progress, and does not affect the general health as do the other granulomata. *Treatment*—No treatment is effectual, as it returns if removed.

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### HYDROPHOBIA.

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A specific disease due to inoculation with the saliva of a rabid animal. Nine-tenths of those bitten in the face contract the disease. The period of incubation extends from two weeks to two years, but the average period is from six weeks to three months.

*Pathology.*—Probably due to a specific organism. Symptoms—Tingling of the wound, mental depression, and a slight difficulty in swallowing are early symptoms. Later the difficulty of swallowing is increased; the muscles of deglutition are thrown into spasms by even the sight or sound of water, hallucinations are present, and a viscid saliva flows from the mouth. Death occurs after a period varying from 1 to 10 days from exhaustion or spasm of the respiratory muscles.

*Treatment.*—Treat recent bite as any other poisoned wound—*i.e.*, with suction, incision, excision, and caustics; excise cicatrix if wound has healed. Try Pasteur's treatment by inoculation with attenuated virus. When symptoms have developed place patient in a quiet, darkened room, and alleviate with opium, chloral or chloroform. Injections of pilocarpin and curare have been successful.

## TETANUS.

*Tetanus* is an infective disease, depending on a specific virus, introduced through a wound, oftenest a lacerated wound of the hands or feet.

*Symptoms.*—From the fourth to the tenth day after inoculation, the patient finds a stiffness about the jaws and throat, and is unable to open his mouth widely. Later other voluntary muscles fall into a state of tonic spasm, with frequent exacerbations, arching the body backwards, so that it rests on head and heels, opisthotonos, or forward emprosthotonos, or latterly pleurosthotonos. The angles of the mouth are drawn upwards—(risus sardonicus)—skin bathed in perspiration, no sleep, intellect quite clear. The patient dies asphyxiated in a spasm or from exhaustion. *Tetanus neonatorum* is due to the wound caused by dividing the umbilical cord. Usually fatal. An idiopathic form of tetanus, less fatal than the traumatic, is said to occur in tropical countries from exposure to cold. *Diagnosis*—It may be confounded with—1. Strychnia poisoning; 2. Hydrophobia. 3. Hysteria; 4. Rheumatism. In strychnia poisoning the spasms are clonic and death is rapid. Hydrophobia may be distinguished by clonic spasms, history of case, long incubation, aversion to fluid, flow of viscid saliva, hallucinations. *Post-mortem appearance*—No constant special change is met with. *Treatment*—Antitoxine serum, chloroform, chloral, morphia, Indian hemp, Calabar bean. Ice to spine.

## MALIGNANT PUSTULE.

*Malignant Pustule*, or Charbon, or Wool-sorters' disease, is due to inoculation with a specific bacillus, that which produces anthrax in cattle. *Symptoms*—A pimple soon developing into a black eschar, surrounded by vesicles and a large area of redness and edema, and attended with symptoms of blood poisoning. If untreated, it is usually fatal. *Treatment*—Excise indurated area and apply a strong antiseptic—i.e., solution of iodine or chloride of zinc.





## TUMOURS.

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*Definition.*—The word *tumour* may be applied loosely to almost any swelling or lump, but as a scientific term it is limited to “Atypical, new formations, not the result of an inflammation.” This definition excludes hypertrophies, because they are typical—retention cysts and hæmatomata, because although they may be new in the sense of being recent, they are not made up of new tissue—abscesses, and infective swellings, because they are the result of inflammation.

*Development and Progress.*—A tumour consists of cells formed by the multiplication of pre-existing cells. It seems to grow *per se*—i.e., without any addition from the cells of neighbouring parts, but whether it starts from a portion of mature tissue or from a “resting spore” of embryonic tissue, is uncertain.

Its general outline and the arrangement of the cells, not the presence of any special cells or other bodies, distinguish it from normal tissues. It is without nerves, and its nutrition is regulated rather by conditions within itself than by the conditions of the body generally. It is not dependent, as far as we know, on an irritant, and we never recognise in it any conservative tendencies, such, for instance, as at times make inflammation salutary. It seems an unmixed evil. It may remain stationary, grow slowly, rapidly, or intermittingly. The more rapidly it grows the sooner it degenerates. It retains throughout the type of the cell from which it originates—i.e., if from the epi- or hypo-blast, it remains epithelial throughout; if from the meso-blast, it may never advance beyond an embryonic stage (sarcoma), or it may go on to meso-blastic

tissue of a high type, such as muscle or bone. It may undergo various changes, such as fatty, pigmentary, calcareous, colloid, or mucoid degenerations; ulceration; sloughing; or total necrosis; or hæmatomata, cysts, or abscesses may form in it.

*Ætiology.*—This is a doubtful question. There are three theories—

1. *An embryonic rudiment.*—Cohnheim thinks that the cause of the subsequent tumour is to be sought in a fault or irregularity of the embryonic rudiment. The tumour is not congenital, but the rudiment of it is—i.e., in an early stage of embryonic development, more cells are produced than are required for building up the part concerned, so some cells remain unappropriated, and their development is arrested for a time, but they are easily called into activity as, owing to their embryonic character, they are endowed with a marked capacity for proliferation. It is urged against this theory—That nothing is known of the existence of such an embryonic rudiment, and that it does not account for chimney sweeps' cancer and other cancers induced by an irritant.
2. *Injury.*—So many tumours seem to result from an injury that it must be looked on as a contributing cause. It cannot be the sole cause, for we know that inflammation and hyperplasia, not new formations, are the effects of injury. It may, however, by producing hyperæmia bring extra food to cells ready to grow; it may diminish physiological resistance of tissues; it may liberate cells encapsuled or otherwise detained. Its effects are very plain in chimney sweeps' cancer, in cancer of old scars, and smokers' epithelioma of lip.
3. *Parasitic Theory.*—So many diseases have been traced to parasites, one is inclined to make no exception of tumours, but as yet all attempts to discover a parasite or to produce tumours by inoculation have failed.
4. *Heredity.*—This certainly has an influence, but it has yet to be decided whether redundant germinal material is passed on just as is a sixth finger, or whether merely a feeble resistance of the tissues or other indirect cause.





## CLASSIFICATION.

*Classification.*—Tumours are classified clinically and anatomically.

Clinically tumours are divided into simple and malignant.

*Simple tumours* grow slowly, often intermittingly; consist of fully formed tissue; are homologous in structure—that is, they resemble the tissue in which they are situated; are usually encapsuled; never infiltrate surrounding parts; do not recur if fully removed; do not disseminate themselves either through the lymphatics or blood-vessels; do not interfere otherwise than mechanically with health, except in so far as they are liable to inflammation and degeneration.

*Malignant tumours* are heterologous in structure—i.e., deviate from the structure of the tissues in which they are situated; are not encapsuled, though often well-defined at first; grow continuously, often quickly; infiltrate surrounding parts; soon ulcerate and slough, and bleed, their growth still going on; are liable to recur, however fully removed; disseminate themselves either through the lymphatics or blood vessels, or both, and thus cause secondary tumours in internal organs and other parts, which sooner or later interfere materially with the nutrition of the body and bring about a condition known as cancerous cachexia. A malignant tumour left to itself destroys life by the exhaustion produced by hæmorrhages and discharges, or through the invasion of vital parts by primary or secondary growths.

From these distinguishing features the implication of the tissues of the neighbourhood and the formation of metastases may be selected as differential criteria. What it is gives to tumours this power of invasion by infiltration and generalisation, is uncertain. Some seek it in the properties of the tumour itself, others in a failing of physiological resistance to invasion in the parts bordering on the tumour, or in the body generally.

*Anatomically.*—Tumours may be classified according to their resemblance to some normal tissue, embryonic or adult.

## MESOBLAST.

- |   |                |
|---|----------------|
| 1. Type of embryonic connective tissue (malignant) ... .. | Sarcomata      |
| 2. Type of fully developed connective tissue—viz.,        |                |
| Of Fibrous Tissue ... ..                                  | Fibromata      |
| „ Mucous „ ... ..   | Myxomata       |
| „ Adipose „ ... ..  | Lipomata       |
| „ Cartilage ... ..  | Chondromata    |
| „ Bone ... ..   | Osteomata      |
| 3. Type of higher tissues—viz.,                           |                |
| Of Muscle ... ..  | Myomata        |
| „ Nerve ... ..  | Neuromata      |
| „ Blood-vessels .. ...                                    | Angiomata      |
| „ Lymphatic Vessels ... ..                                | Lymphangiomata |
| „ Lymphatic glands ... ..                                 | Lymphadenomata |

## EPIBLAST AND HIPOBLAST.

- |  |   |
|--|---|
| 4. Type of epithelial tissues—viz.,          |   |
| Of Secreting glands ... ..                   | Adenomata   |
| „ Papilla of skin, or Mucous membrane ... .. | Papillomata                                       |
| MALIGNANT—                                   |   |
| „ Spheroidal-celled epithelium ...           | 1. Scirrhus<br>2. Encephaloid<br>Carcinomata      |
| „ Columnar-celled epithelium ...             | Columnar-celled<br>Carcinomata                    |
| „ Squamous-celled epithelium ...             | Squamous-celled<br>Carcinomata<br>(Epitheliomata) |

## SARCOMA.

*Sarcomata*.—"A sarcoma is a tumour composed of embryonic connective tissue, which shows no inclination to fulfil its ultimate developmental intention. Instead of the energy of the cells being occupied in generating connective tissue, it is wholly expended in causing the cell to reproduce itself." *General Histology*.—All sarcomata consist of cells imbedded in intercellular substance. The cells predominate greatly, and may be either small or large, round, spindle, or myeloid. The intercellular substance varies in amount and character; it may be mucous, fibrous, cartilaginous, or osseous; it penetrates between the individual cells, and so helps to distinguish sarcoma from carcinoma; it, in conjunction with the form and size of the cells, makes the varieties of sarcoma. Thus, when a bony

stroma includes a preponderance of small spindle cells, the growth is spoken of as "a small spindle-celled osteo-sarcoma." Fatty degeneration, giving rise to softening, hæmorrhages, and cystic cavities, is a very frequent modifying factor. Calcareous, mucoid, and pigmentary degenerations also occur. *Etiology*.—"If," says Cohnheim, "we desire to find the histological prototype of a spindle or round-cell sarcoma, we must go back to the earliest embryonic periods. Only in the first beginnings of the development of connective tissue organs is there a stage when these organs are composed of tightly-packed cells, together with a very small amount of ground substance. A cluster of cells in this early stage remains unappropriated and becomes arrested wholly or partly, and by, at a later period, resuming growth and that marked capacity for proliferation with which embryonic tissues are endowed, forms a sarcoma." *Physical Characters*.—In their primary stage they have a soft, semitranslucent, grey, fleshy appearance; later on the secondary changes, already referred to, introduce their special physical characters. *Clinical Characters*.—Sarcomata are malignant growths; they tend to infiltrate a wide area, and so their complete removal is difficult, and they are prone to recur locally after removal. Their general dissemination is through the blood, rather than through the lymphatic system—the fact that the walls of the blood-vessels are thin, and sometimes actually formed of sarcoma cells, favour this channel of entrance. "As a rule, the softer and more vascular the tumour and the less its tendency to form fully developed tissue, the greater its malignancy."

*Fibromata* or tumours of fibrous tissue. They are seen in two forms—viz., the *soft*, constituting wens, and *moluscum fibrosum*; and the *hard*, of which we have instances in fibrous epulis, fibrous polypi, and fibrous tumours of nerves. The so-called uterine "fibroids" are not pure fibroids, being, as a rule, largely composed of involuntary muscular tissue.

The *Myxomata* or tumours of mucous tissue, a structure of which in the adult we have a sample in the vitreous body of the eye.

They are not new formations which have undergone mucoid degeneration, but are mucoid from the first. They are seldom found pure, being mostly in combination with other growths.

*The Lipomata* or fatty tumours appear as soft, semi-fluctuating movable masses. They sometimes so much resemble cold abscesses or cysts that an aspirator must be used for diagnosis, but a fatty tumour slips from under the finger in a way an abscess does not, and dimples when pinched.

*The Chondromata* or cartilaginous tumours usually spring from the ends of long bones, rarely from cartilage. The fingers, the neighbourhood of knee and shoulder, are favourite seats. They have a hard elasticity, and are sometimes smooth, sometimes lobulated. Cartilage often develops in and gives a variety to sarcoma.

*Osteomata*, Exostoses, or tumours consisting of bone—*i.e.*, of newly-formed bone as distinct from inflammatory ossifications and calcifications. There are two chief forms—1. The ivory exostoses, growing from periosteum, usually on flat bones, such as lower and upper jaw and bones of skull. 2. The spongy exostoses growing from cartilage, usually at junction of an epiphysis of a long bone with the shaft. As with chondromata, the neighbourhood of knee and upper end of humerus are favourite seats.

*Myomata*.—Tumours of muscular tissue, two varieties.—1st. The striated, very rare. 2nd. The non-striated, found in the uterus, prostate, and the intestinal tract. They incline to become pendulous and form polypi. In the uterus they are largely associated with fibrous tissue, and though named “fibroids” are properly “fibro-myomata.”

*Neuromata*.—Tumours of nerve tissue. True neuromata are very rare, but the name is commonly given to any tumour that forms on a nerve. Small multiple fibromata of superficial nerves are not very uncommon. They are not painful as are true neuromata.

*Angiomata*, Nævi, or Vascular Tumours.—There are two varieties,





1st. The plexiform, always congenital, composed of dilated and tortuous capillaries, held together by connective tissue, and constituting the ordinary mother's mark. 2nd. The cavernous or erectile tumours made up of spaces composed of fibrous tissue, lined with endothelium like a vein, freely inter-communicating and generally resembling the corpus cavernosum penis.

*Lymphangiomata*.—Tumours composed of lymphatic vessels. Lymphatic vessels on rare occasions form tumours, after the same fashion as the two varieties of nævi just described.

*Lymphadenomata*.—Tumours of lymphoid tissue—viz., tissues resembling that of the follicles of the lymphatic glands. The development of these tumours characterises Hodgkin's disease. They are not distinguishable in their early stages from inflammatory enlargements of lymphatic glands.

*Papillomata*.—Tumours resembling in structure ordinary papillæ. The papillæ may be short, as in an ordinary wart, or long and branching, as in a villous tumour. "In a wart all the epithelium is on the surface of the cutis no matter how irregular that surface may be; once epithelium begins to invade the cutis the wart has become a cancer." Varieties.—1. The ordinary skin warts, including condylomata and venereal warts. 2. Villous tumours, such as are found in the bladder. 3. Corns. 4th. Horns. Some look on papillomata as fibromata, become papillary by the physical conditions of their position on a free surface. Often papillomata take the form of polypi. Polypus is a clinical designation given to any pedunculated tumour springing from a mucous surface.

*Adenomata*.—Tumours of the type of, and growing in connection with, a secreting gland. They resemble in structure but not in function the gland from which they spring (*acinous*, instance adenoma of breast; *tubular*, instance polypus of rectum), and their ducts do not join those of the gland. They may be simple or malignant. The simple more closely copy in structure the parent



*Scirrhus* is a slow-growing hard cancer, consisting of cells derived from glandular or spheroidal epithelium in an abundant fibrous stroma, which contracting puckers the skin, and gives, on being cut, a cupped appearance, and characters that liken it to a raw turnip or an unripe pear. It occurs most commonly in the breast.

*Encephaloid* is a quickly-growing soft cancer, resembling brain substance, very vascular, with abundant cells (glandular), and comparatively little stroma. It is most highly malignant. It may fungate and bleed (fungus hœmatodes). Some soft sarcomata are liable to be confounded with it. It occurs, as a rule, primarily in the testis and mamma; secondarily, anywhere internally.

*Epitheliomata* are of two varieties, viz:—Squamous-celled and columnar-celled. They are in some situations the least malignant forms of cancer, at times limiting themselves to the primary site or to the neighbouring glands.

*Squamous-celled Epithelioma* always grows from a squamous-covered surface; points where skin and mucous membrane meet, such as the lips and anus, being common seats. It seems to be often called into being by an irritant, such as a clay pipe, a jagged tooth or soot. Its malignancy varies with locality, slight on the face, moderate on the lips, very great on the tongue. It usually first appears as a hard tubercle or wart, which soon ulcerates, leaving an ulcer with excavated base and warty edges.

*Columnar-celled epithelioma* grows from columnar epithelium, and consequently is found in the rectum, uterus, stomach, and intestines. It is not, as a rule, highly malignant, and kills rather by mechanical obstruction, local irritation or hæmorrhage than by dissemination.

*Colloid Cancer*.—Colloid is a name given to a degeneration that affects cancerous, sarcomatous, and other growths. Colloid cancer is seen to consist of large thin-walled alveoli, filled with a structureless material resembling thin clear glue or honey.

*Treatment*.—All tumours should, when it is reasonably convenient, be completely excised, because, in addition to being

troublesome and useless appendages, they may grow to an indefinite size, may ulcerate or take on a malignant action.

Malignant tumours should, if it is feasible, be removed with the least possible delay. In excising them the knife should be carried well broad of the structures that are seen to be diseased, and if the lymphatic glands in the neighbourhood are enlarged, they also should be removed.

### CYSTS.

A cyst is a collection of liquid or half solid material in a capsule. Inasmuch as it is not necessarily a new formation it is not, by some, classified as a tumour.

The following is Green's classification:—

1st. Cysts from collections in pre-existing spaces—

“a.” Retention cysts: instance, sebaceous cysts.

“b.” Exudation cysts: instance, housemaid's knee.

“c.” Extravasation cysts: instance, hæmatocele.

2nd. Cysts of new formation—

“a.” Cysts from softening of tissues: instance, cysts in tumours.

“b.” Cysts from extravasation into solid tissues: instance, certain cysts in brain.

“c.” Cysts from effusion into connective tissue: instance, bunion.

“d.” Cysts formed round parasites and foreign bodies: instance, hydatid cysts.

“e.” Congenital cysts: instance, dermoid cysts. Dermoid cysts are usually due to an in-folding of a piece of epiblast in deeper tissues.

*Treatment.*—Tapping, incision and drainage, excision.





## INJURIES AND DISEASES OF SPECIAL TISSUES AND REGIONS

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IN studying injuries and diseases of special tissues and regions, the student should define for himself what there is general and what special in each case and each class of cases. For instance, when studying injuries and diseases of the bone he should look to see do mechanical and septic irritants—tuberculosis, syphilis, and malignant disease—behave differently there from the way they do elsewhere, and, if so, in what way. By making such contrasts he will soon familiarise himself with the general features of each disease, and also make comparatively easy the task of remembering their peculiarities.

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### INJURIES AND DISEASES OF THE SKIN AND ITS APPENDAGES, AND OF THE SUBCUTANEOUS CEL- LULAR TISSUE.

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#### ONYCHIA—

Inflammation of matrix of nail—may be simple, scrofulous, or syphilitic. As there is little special to distinguish one variety from another they must be diagnosed on general lines. In all an ill-conditioned nail is found more or less loosely embedded on an inflamed matrix with a line of ulceration at its root. *Treatment.*—Anti-septic, anti-scrofulous, or anti-syphilitic, as the case may be.

## INGROWING TOE-NAIL.

The common site is the sulcus, where the soft tissues overlap the outer edge of the nail of the great toe. A highly sensitive ulcer forms at this point, into which a spicula of nail, resulting from attempts to cut off the offending edge, often grows forward. *Treatment*.—Remove pressure; wedge out the nail and keep it out. In obstinate cases, remove a longitudinal strip of nail and matrix and overlapping tissues.

## LUPUS

Is a tuberculosis of the skin. Reddish brown nodules the size of a pin's head, and differing from true tubercle only in being highly vascular, appear, mostly on the face. These soon coalesce into a uniform infiltration, while fresh nodules appear in the neighbourhood and so extend the disease. They are situated primarily in the corium; but as they grow they destroy the entire thickness of the true skin, remaining covered merely by epithelium. The infiltrated patches may degenerate, become absorbed and replaced by a white scar of cicatricial tissue—*lupus non exedens*; or they may soften and dry on the surface in scabs which, on separating, reveal an ulcer—*lupus exedens*. This latter form of the disease may extend deeply, and cause destruction of the nose and neighbourhood. It is a disease of early life, and rarely begins after puberty. *Diagnosis*.—It has to be distinguished from impetigo, syphilitic affections and rodent ulcer. *Treatment*.—The growth should be removed by scraping, excision, caustics or actual cautery. Scarification benefits the milder forms.

## SCROFULODERMA.

Tuberculous affections of the skin, other than lupus, are included under this head. One meets with areas of dark, bluish, undermined skin, marking places where tuber-





culous masses have formed, softened, and partially discharged themselves. Sometimes several tuberculous foci form subcutaneously in one locality and discharge themselves through separate openings, which, growing larger, finally unite and expose a widely ulcerated surface—scrofulous ulcers. *Treatment*.—Remove the undermined skin with a scissors, and the tuberculous tissue with a Volkman's scoop.

### RODENT ULCER.

This ulcer, till lately looked on as a variety of lupus, is now considered to be a form of epithelioma, differing from true epithelioma by slowness of growth and by not disseminating itself through the lymphatics or blood stream. It begins—usually in subjects beyond middle life—as a hard wart or tubercle, which ulcerates and spreads by continuity of tissue, not by disseminated growths. It is single, often situated near the inner angle of eye (Jacob's ulcer); the edges are raised but not indurated, and the surface, which does not granulate, has been likened to an irregular layer of pink wax. It never heals, but often makes imperfect attempts at doing so with cicatricial tissue that does not contract. When it attacks bone it penetrates deeply, and may engage the brain and its membranes. *Diagnosis*.—It is distinguished from syphilis and true cancer by the slowness of its growth; from lupus by its method of extension and the age of its subjects. *Treatment*.—Complete extirpation; caustics; chlorate of potash locally and internally.

### MOLLUSCUM FIBROSUM.

A disease marked by the formation of pedunculated soft fibromata. *Treatment*.—Excision.

### WARTS.

. Papillomata (*vide* p. 113). They occur in early life chiefly upon the hands, in late life on the neck and trunk, and in venereal cases

on the genitals and around the anus. *Treatment*.—Apply acetic acid or solvine (salicylic acid, gr. 60; extract of Indian hemp, gr. 8; flexible collodion,  $\frac{3}{4}$  strength, one ounce).

### CORNS

Consist of an overgrowth of epithelium and a hypertrophy of the underlying papillæ. They are due to pressure, and are classified as hard and soft. *In the hard variety* the cuticle grows into a conical horny mass, the apex of which pressing downwards on the cutis causes pain. The *soft variety* occurs between the toes where the moisture keeps the epithelium soft. *Treatment*.—Relieve pressure and apply solvine, separating the toes, in the case of soft corns, with lint steeped in tincture belladonna.

### BOIL.

A circumscribed inflammation of the skin and subcutaneous tissue, terminating in a slough (the core) which is discharged through a single opening. It begins in connection with a hair and resembles an acne pimple; its later characters, &c., are known to all. It is probably due to the infection of a sebaceous gland or hair follicle with a micro-organism (*staphylococcus pyogenes*), some disturbance of health favouring the development. *Treatment*.—If seen early extract the central hair, and bathe with very hot carbolic lotion; when it becomes painful apply equal parts of soft soap, extract of belladonna and glycerine. Keep neighbouring skin disinfected with solution 1 in 20 of carbolic acid.

### CARBUNCLE

Occurs in men beyond middle life, especially if suffering from diabetes or other depressing conditions. Like a boil, it is a brawny, painful infiltration of the skin, which ends





in sloughing. It differs from a boil in being larger, less circumscribed, and in discharging itself through several openings which map out an area of skin that often sloughs away, leaving a rugged cavity. When it attacks the face it resembles phlegmonous erysipelas, and often induces fatal septic thrombosis. *Treatment*.—Support strength; bathe with very hot carbolic lotion; inject here and there into infiltration at half a dozen places 5 minims of a 1 in 5 sol. of carbolic acid and glycerine; apply a carbolic poultice.

### BED SORES

Are instances of gangrene of the skin, and occasionally of deeper parts, due to pressure. They form over the bony prominences, chiefly the sacrum. Their progress may be described by the words—redness, abrasion, slough; and their causes by pressure, dirt, debility. *Treatment*.—Keep patient dry and clean on a water bed, and, if practicable, change his position frequently.

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# INJURIES AND DISEASES OF ARTERIES.

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## INJURIES OF ARTERIES.

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INJURIES of arteries come under the usual classification of injuries. Severe contusions at times produce occlusion of the vessel. Subcutaneous ruptures and lacerations are usually due to a wheel passing over the part, or to too forcible movements in reducing dislocations, or breaking down adhesions of joints. In partial ruptures only the internal and middle coats are torn. In complete rupture, as when a limb is torn off, the external coat is the last to give way, and it, together with its sheath, is usually stretched and twisted over the orifice, thereby checking the bleeding. Subcutaneous injuries give rise to extravasations of blood and traumatic aneurysms.

### WOUNDS OF ARTERIES

May, of course, be of any degree—from one that only partially divides the coat to one that cuts it across. A vessel transversely punctured bleeds more than one completely divided, because there is no contraction and retraction of the inner and middle coats. Longitudinal punctures, if slight, may heal and give no trouble, or they may lead to aneurysm (*vide* p. 124).

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## DISEASES OF THE ARTERIES.

## ACUTE ARTERITIS

Has no existence except, firstly, in so far as arteries share locally in the inflammation following an injury (in this connection it is the chief cause of secondary hæmorrhage); and, secondly, as the result of embolism.

If the embolus is septic, as in a case of infective endocarditis, the inflammation will be suppurative. Embolic arteritis is a cause of aneurysm, especially in children. It is in these connections, and not as a distinct affection calling for special treatment, that arteritis attracts the attention of the surgeon.

## CHRONIC ENDOARTERITIS OR ATHEROMA

Occurs in elderly subjects as a result of mechanical strain, vascular tension, and syphilis. It is a chronic inflammation, leading to over-growth of the deeper part of the inner coat. The new production, although it may develop into fibrous tissue, often undergoes fatty degeneration, and then tends either to soften or to calcify. When softening occurs there is found a soft, cheesy mass—"atheromatous abscess"—which, on bursting, makes an "atheromatous ulcer." Calcification gives rise to those calcareous plates which, intermixed with yellow opacities, and either bare or covered with endothelium, are so commonly seen in the aorta and its primary divisions. Atheroma tends to make arteries long, tortuous and dilated. It is a fruitful source of aneurysms, thrombosis, and embolism; and so may bring about the occlusion and obliteration of vessels.

## SYPHILITIC ARTERITIS.

A fibroid thickening of the inner coat of small arteries, chiefly those of the brain, often ending in obliteration of the vessels, is one of the effects of syphilis.

Primary fatty, calcareous, and amyloid degenerations are other pathological conditions sometimes met with in the arteries.

## ANEURYSM.

An aneurysm is an abnormal swelling permeated by circulating blood. It is due to dilatation, or rupture, or wound of the coats of an artery and may be *traumatic* or *spontaneous* in origin.

## TRAUMATIC ANEURYSM

May be caused by the puncture of an artery through a wound, which, owing to its obliquity or other cause subsequently becomes closed; or there may be no open wound, a fragment of bone or violent strain causing the injury to the vessel. It occurs in two forms—the *diffuse* and the *circumscribed*.

## DIFFUSE TRAUMATIC ANEURYSM

Is a misleading name given to a subcutaneous arterial hæmorrhage as long as the injured artery communicates with the effusion, or, in other words, as long as the hæmorrhage continues. There is no sac.

## CIRCUMSCRIBED TRAUMATIC ANEURYSM.

The existence of a sac constitutes the difference between this and the diffuse variety. The sac may consist—1st, of a stretched cicatrix in a wounded artery; 2nd, of a cicatrix formed in tissues external to the artery. This latter consists of coagulated blood strengthened by inflammatory exudation. For either sac to form there must be a temporary cessation of the hæmorrhage.

Either form may be mistaken for an abscess, for there is throbbing pain, redness, swelling, and œdema. The history of case, the position of the tumour, the presence of a bruit, the indications given by pressure on the tumour and on the artery leading to it may clear up the doubt, if not, aspiration will do so.

*Treatment.*—The diffuse variety must be treated by ligature of the artery above and below the wounded point. This is





a difficult operation when the aneurysm is so situated that pressure cannot be applied above it—*i.e.*, on the cardiac side. In such cases a small opening, sufficient to admit one or two fingers, should be made in the swelling, the bleeding point felt for, and when found compressed, and the operation of ligature then proceeded with. The circumscribed variety should be ligatured immediately above the swelling if convenient, or if not at a higher point; or when the swelling is a small one a ligature above and below may be applied, the sac being laid open and the clot turned out.

#### ANEURYSMAL VARIX AND VARICOSE ANEURYSM.

Arterio-venous wounds, common in the days of venesection, occasionally give rise to conditions known as aneurysmal varix and varicose aneurysm. In the former there is adhesion and direct communication between the two vessels at the seat of injury, at which point also the vein is dilated and gives on auscultation a sound like to that made by a fly in a paper bag. In the latter a circumscribed traumatic aneurysm intervenes between the opening in each vessel.

*Treatment.*—Apply pressure with a pad on the enlargement, and if it grows larger notwithstanding, then ligature the artery above and below.

#### SPONTANEOUS ANEURYSM.

The causes are predisposing and exciting. *Predisposing*: atheroma, embolism, and occupations calling intermittingly for violent muscular exertion. *Exciting*: strains, blows, and wounds (hence aneurysm most frequent in middle life).

*Classification.*—1, Fusiform; 2, Sacculated; 3, Dissecting.

1. *Fusiform.*—The vessel is dilated throughout its whole circumference, and it is also enlarged generally. The inner and outer coats are thickened, the middle stretched.

2. *Sacculated*.—From one point on the vessel a more or less narrow opening leads into the sac of the aneurysm. The sac may be formed of the coats of the artery (one or more), in which case it is called true; or the coats of the artery may be absent, condensed connective tissue taking their place, in which case it is called false. As a rule it is the outer coat strengthened by plastic exudation that forms the sac, the aneurysm having started at a point where atheroma had destroyed the inner and a part of the middle coat.

3. *Dissecting Aneurysm*.—The blood, starting at some point where atheroma has destroyed the inner coat, makes a way for itself for a certain distance between the layers of the middle coat, and thus forms a sac; or it may, after a preliminary burrowing, burst through the outer coat into the areolar tissue, or through some diseased spot of the inner coat back into the parent stream.

An aneurysmal sac usually contains layers of colourless fibrin—"the active clot," and more or less coagulum—"the passive clot."

*Progress*.—When there is high arterial tension, aneurysms increase rapidly in size, and may prove fatal by—1st, rupture; 2, pressure on important parts; 3, gangrene of the part supplied by the engaged vessel. When the circulation is feeble through an aneurysm, it may run a chronic course, or it may undergo spontaneous cure by the formation of either an active or a passive clot. The feeble circulation in question may be owing to the heart's action, or to the impaction of a clot either in the mouth of the sac or in the artery beyond, or to pressure. Amongst the incidents causing pressure are tumours, the aneurysm itself, effused blood. If the stoppage of the circulation in the aneurysm is complete, whatever the cause, a passive clot will result; if partial, an active one.

When rupture takes place into the tissues, a circumscribed aneurysm is replaced by a diffuse traumatic one; when into a serous cavity, there is usually a large rent and a rapidly fatal





termination; when through mucous membrane or skin, there is a small ulcerated opening, and as further the ulcerative progress tends to the formation of coagula, many small hæmorrhages may precede the fatal one.

*Symptoms.*—There is a pulsating tumour in the course of some artery. The pulsation is distensile; on auscultation, a rasping bruit is usually audible; the tumour is made more tense by pressure on the artery below, more flaccid by pressure above, and when so made flaccid is emptied by direct pressure. On all pressure being removed the blood rushes back with a thrill; the pulse below the aneurysm is delayed, and is smaller and less forcible than on the sound side. As the aneurysm grows it presses on neighbouring parts. The veins by œdema, and the nerves by pain and loss of function, are the earliest to show pressure symptoms.

*Diagnosis.*—An aneurysm may be confounded with—1st, an abscess or tumour over an artery; 2nd, a pulsating sarcoma, or a nævoid growth; 3rd, rheumatism or neuralgia.

*Treatment.*—Treatment is directed to regulating the flow of blood through the aneurysm. It should be constitutional and local.

*Constitutional* includes complete rest, both mental and bodily; restricted diet—such as bread and butter, 4 oz.; meat, 3 oz.; potatoes, 3 oz.; fluid, 8 oz., in the day; no stimulants; in some cases occasional small bleedings, and iodide of potassium.

*Local* includes:—1st. *Ligature*, which may be applied (*a*) both on the proximal and distal side, the sac being opened and the clot cleared out (old operation), or the sac being dissected out (recent modification; (*b*) on the proximal side only, either immediately above (Anel) or at a distance (Hunter); (*c*) on the distal side only, either to the main trunk (Brasdor) or to one of the main branches (Wardrop). The proximal sites are always, when feasible, to be preferred to the distal, because they

protect the sac from the direct impulse of the blood. Of the proximal points, Hunter's is better than Anel's, for it not only leads one to a sounder part of the artery, and one more easily ligatured, but it allows of intermediate branches carrying a small supply of blood to the sac for the formation of an active clot.

The dangers of ligature are much reduced since the introduction of antiseptics. They are (a) secondary hæmorrhage, (b) suppuration and sloughing of sac, (c) phlebitis, (d) gangrene, (e) recurrent pulsation.

2nd. *Pressure*.—Pressure may be applied so as to completely stop the circulation, or so as to do so only partially. It may be *direct* or *indirect*, but the former is now seldom used.

*Indirect* pressure may be (a) digital, (b) instrumental, (c) by Esmarch's bandage, (d) by flexion. Of these, digital compression is the best, for it can be limited to the artery, and better regulated in every way. It may be applied intermittingly or continuously for some days. Instrumental pressure is effected by tourniquets, of which there are many patterns. When Esmarch's bandage is used, it is carried firmly up to the aneurysm, then lightly over, and again firmly beyond it. When it is not practical to carry it beyond the aneurysm, a tourniquet or digital compression may take its place on the proximal side. The intention is to lock the blood in the aneurysm and cause the formation of a passive clot.

Pressure by flexion of the limb is used chiefly with popliteal aneurysm. It is a combination of direct and indirect pressure. the aneurysm being made to press on the artery, and so check its own supply.

3. *Manipulation*.—This is done with a view to detach a portion of the coagulum, and so produce blockage.

4. The *introduction* directly into the sac of something likely to occasion coagulation of the blood—viz., galvano-puncture, acupuncture, the insertion of fine iron wire, injections, &c. These expedients should be adopted only in cases where neither ligature nor pressure is applicable.





# INJURIES AND DISEASES OF VEINS.

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## INJURIES OF VEINS.

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RUPTURES, contusions, and wounds occur to veins in much the same way that they do to arteries. *The dangers* are also the same with the addition, in case of open wounds, of *septic phlebitis* and *entrance of air*. Treatment also the same, except that more reliance may be placed on pressure and position to check venous hæmorrhage, and that it is allowable to pinch up and ligature a small puncture in a large vein.

*Entrance of air* into veins occurs when a large vein at the root of the neck or in the axilla having been opened is held open—"canalised"—owing to its partial division or to traction on it during an inspiration.

*Symptoms*—A sucking, gurgling sound, followed by collapse dyspnœa, and oppression about the chest. Death usually immediately, sometimes after hours or days, is the usual result.

*Pathology*.—The air and blood are whipped in the heart into a frothy fluid which is unsuitable for circulation through the heart and vessels.

*Treatment*.—Prevent further entrance of air by digital compression and ligature of the wound in vein. 2nd. Try and keep the heart and lungs going by artificial respiration and other stimulants.

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circulation, or that otherwise causes intravenous pressure. Much standing and walking affects the saphenous veins, especially in tall subjects, for when the muscles of the leg are made tense the blood is driven from the deep into the superficial veins, which in some cases, become distended to an extent to render the valves incompetent. When this happens, the weight of a long column of blood has to be borne by the walls of the veins and varicosity is induced.

*Diagnosis.*—The patient should be kept standing for some time, and be examined in the upright position. The veins are then evident to sight and touch. *Symptoms.*—They do not at first excite any trouble; later fatigue, slight pain, and fulness after much walking or standing are complained of; later still phlebitis, usually of a plastic character, and sometimes bringing about a spontaneous cure, may occur; or a rupture with hæmorrhage; or a congested and eczematous condition of the skin, often terminating in ulceration. The junction of the lower and middle third of the leg is the favourite site for these latter disturbances. *Treatment.*—Palliative—Elastic stockings and bandages. Radical—For a general varicosity of the veins of the leg it is plain that no truly radical treatment can be applied; but circumscribed enlargements may be removed by—1, excision; 2, acupressure; 3, subcutaneous ligature; 4, injections. Of these, excision is the best; in all, the danger of exciting septic phlebitis must be borne in mind.

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# INJURIES AND DISEASES OF LYMPHATICS.

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## LYMPHANGITIS.

ANGEIOLEUCITIS, or inflammation of the lymphatic vessels, is due to an absorption by them of septic matter from some point in their lymph area. The inflammation engages the coats of the vessels and sometimes the neighbouring areolar tissue. Its extension is usually limited by the nearest lymphatic glands, which is the most likely site of suppuration, should that occur. Resolution is, however, a more common termination. The special signs are a number of red streaks, tending to merge into a band about an inch broad, extending from the point of inoculation to the neighbouring lymphatic glands. These tracks lack the defined margin of erysipelas, and the cord-like hardness of phlebitis. *Treatment*—Drain and make aseptic the original point of infection. Smear glycerine and ext. of belladonna along affected vessels. Elevate the limb and keep it at rest.

## LYMPHATIC VARIS,

Giving the skin an appearance which has been compared to the rind of an orange, is a very rare disease.

## ELEPHANTIASIS ARABUM.

A disease, chiefly of the tropics; is characterised by the presence in the lymphatic vessels of a small worm, the *Filaria sanguinis hominis*, which, by obstructing the return of the lymph, causes enlargement of a particular part, usually one of the lower extremities, the scrotum, or the labium.

*Treatment*—Elevation, bandaging, and in some cases removal of the affected part.

### LYMPHADENITIS.

Inflammation of the lymphatic glands is usually due to the presence of irritants conveyed to them by the lymphatic vessels. It may be erysipelatous, scarlatinal, diphtheritic, or due to any of the organisms of suppuration. The inflammation often goes on to suppuration and engages the cellular tissue in the neighbourhood (peri-lymphadenitis), and is accompanied by the usual inflammatory changes and symptoms, and requires antiphlogistic treatment, at the same time that antiseptic interference is applied to the primary focus of infection.

Chronic enlargement may be syphilitic, tuberculous, or due to some other chronic irritation in a delicate subject, such as eczema of the head, enlarged tonsils, carious teeth, or sup-puration of middle ear. Simple enlargements are very liable to become tuberculous; should they escape such infection they usually subside on removal of the exciting cause. The usual progress of tuberculous glands is well known—caseation, softening, and disintegration, with undermining and destruction of the skin, extending over a long period, and subsequent disfiguring cicatrices. In some few favourable cases the caseous mass becomes encapsuled, calcifies, and is absorbed (*vide* tuberculosis, p. 95.) *Treatment*—Removal of any source of irritation; cod-liver oil; sea-air, &c. If glands inclined to soften either excise them or scrape them out through a small incision with a Volkmann's spoon.

Lymphadenoma (*vide* tumours p. 113.)





# INJURIES AND DISEASES OF NERVES.



## INJURIES OF NERVES.

NERVES, like other soft tissues, are liable to division, contusion, strain, rupture, and compression. Such injuries may occasion modification or loss of the function of the affected nerve. They also sometimes set up an inflammation tending to travel upwards along the trunk of the nerve, and productive of a growth of interfascicular fibrous tissue, causing an intractable form of neuralgia.

Muscles robbed of their nerve supply undergo fatty degeneration. Till this is complete they give to electricity a reaction known as the reaction of degeneration—*i.e.*, they refuse to respond to the Faradic current, except for a few days succeeding the injury, while to a mild, continuous current they react with long tetanic spasms. Paralysed parts have, as a rule, a blue, congested appearance, sometimes scaly, sometimes abnormally smooth. The circulation in them is feeble. They easily ulcerate, and they are abnormally cold.

The ends of a divided nerve may unite when they are not remote from one another. They do so by the growth of a strand of connective tissue, in which are developed nerve fibres springing from the axis-cylinder of the central end.

*Treatment.*—Nerves injured, but not divided, require no special treatment. The ends of divided nerves should be brought together by fine sutures. This, if neglected at the time of injury, may be done successfully even many months later. Pending the re-establishment of nervous energy, the affected

parts should be exercised by means of galvanism and massage so as to check the progress of degeneration. Neuralgia resulting from neuritis has been treated by cutting down on the affected nerve and stretching it; by excising a portion of it; and by disengaging it from a cicatrix should it be implicated in one.

### DISEASES OF NERVES.

*Neuritis*, acute and chronic. Inflammatory exudation distends the sheath of the nerve. *Causes*—Injury, cold, fatigue, rheumatism. *Treatment*—That of local inflammations.

*Neuralgia* is a symptom, and often the only one of some pathological disturbance due to general anæmia; depressing, malarial, or hysterical influences; local poisoning by mercury, lead, or copper; peripheral irritation from carious teeth or bone; uterine disease; pressure from tumours, cicatrices, narrowing of osseous canals, foreign bodies, or thickening of fibrous sheath of engaged nerve; exposure to cold.

*Symptoms*.—It is itself a symptom. It frequently affects the fifth nerve (tic douloureux) and the sciatic (sciatica). The pain is usually of an intense, paroxysmal, shooting character, and is sometimes relieved, sometimes increased by pressure. *Treatment*—Treat general and local causes when discoverable. When not, select from following remedies:—Internally—Quinine, arsenic, antipyrin, morphia. Locally—Liniment of aconite, belladonna, chloroform and menthol. Counter-irritant; electricity, acupuncture, nerve-stretching, neurotomy.

### MUSCULAR TIC OR HISTRIONIC SPASM

Is a twitching of the muscles of the face due to some irritation of the facial nerve. *Treatment*—Stretching the nerve.

### PERFORATING ULCER OF FOOT.

A disease depending on degeneration in the sensory fibres of the nerve leading to the affected part, or in the sensory columns





of the cord. It is often associated with diabetes, locomotor ataxy, and spina bifida.

*Diagnosis*.—A probe, passed into what looks like a suppurating corn, situated generally on the ball of the great or little toe, strikes dead bone. The vitality of the neighbouring parts is impaired. Gangrene sometimes supervenes. *Treatment*—Nerve stretching, removal of dead bone, amputation.

#### TUMOURS OF NERVES.

True neuromata are very rare. Fibromata in connection with the nerves, sometimes single, sometimes multiple, are not uncommon (*vide* tumours, p. 112).

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# INJURIES AND DISEASES OF MUSCLES, TENDONS, BURSÆ, AND FASCIÆ.



## INJURIES OF MUSCLES AND TENDONS.

*Muscles and Tendons* are liable to contusions, sprains, ruptures, and displacements. The tendons most liable to displacement are the long head of the biceps, the tendon of the peroneus longus, and those of the wrist and back. To effect replacement, relax the tendon, manipulate, then extend. Subcutaneous rupture of muscles and tendons occurs in heavy elderly men as the result of muscular violence. The point of junction of muscle and tendon is that at which the fibres usually give way. A pit marks the seat of injury, and its nature is indicated by loss of power. The tendo-Achilles, the quadriceps extensor, the triceps, the biceps, the deltoid, the rectus abdominis, are subject to this accident in the order here given.

*Treatment.*—Put and keep for a month the limb in whatever position will best approximate the ruptured ends.

Tendons or muscles lying divided in an open wound should be united by sutures.

## DISEASES OF MUSCLES

Call for no special mention.

## DISEASES OF TENDONS.

Teno-synovitis, or inflammation of the sheath of a tendon, may be simple, tubercular, or infective. The simple variety may be acute or chronic. The former is often the result of exercises that





strain the tendons, especially in gouty subjects, and should be treated on general principles. The latter is usually accompanied by effusion into the sheath of the tendons of clear synovial fluid. The "tubercular" variety is of two kinds; one a fluid effusion with melon-seed bodies, the other a pulpy swelling tending to suppuration, liable to be confused with the "simple chronic," and to be distinguished by its tendency to form a pulpy swelling, ending in suppuration. The "infective," is a form of "paronychia" (*vide* below).

*Treatment.*—When rest with counter-irritation, &c., fail, recourse must be had to antiseptic incision and drainage, together with, in tubercular cases, dissection and scraping away of the diseased tissues.

#### PARONYCHIA.

An inflammation of finger due to infection by pyogenic organism. Four forms—(1). Sub-epithelial: Limited to the ungual phalanx with a tendency to wander round and under the nail. (2). Sub-cutaneous: The pulp of the finger is engaged. (3). Sub-periosteal, usually ending in necrosis. (4). Teno-synovial. This is the most serious variety. The infection is in the sheath of the tendon and rapidly spreads to the hand and arm, and through the lymphatics to the system generally. The sheath of the little finger always and of the thumb sometimes communicates with the general sheath, these of the other fingers are closed opposite the heads of the metacarpal bones. The disturbance is fraught with danger to the finger, hand, and even life of patient.

*Symptoms.*—Intense throbbing pain and all the other signs of suppurative inflammation. The lymphatics are soon engaged. Inability to flex a distal phalanx indicates the engagement of a tendon sheath; and great œdema of back of hand, the engagement of the common sheath.

*Treatment.*—Carbolic poultices and prolonged immersion in hot carbolic solution (1 in 40). Incisions on the first sign of suppuration,

which should be carefully looked for. As these should be free an anæsthetic is indicated. In making them avoid the articulations and the interdigital spaces. The common sheath may be opened above the annular ligament. In necrosis of a terminal phalanx never amputate, merely remove the dead bone as soon as it is loose.

#### GANGLION,

Simple and Compound.—*Simple* occurs usually on back of wrist as a distinct, smooth, elastic tumour, evidently connected with the tendon, and containing a pale yellow gelatinous fluid, together with, at times, melon-seed bodies. It is due either to a cystic enlargement of a cell in one of the fringes of synovial membrane lining the tendon sheath, or to a hernial protrusion of the synovial lining of the tendon sheath, the neck of which has become occluded. Compound occurs usually as an effusion into the sheaths of the palmar flexor tendons, and appears as a swelling which can be passed from the palm to the wrist underneath the annular ligament. It is usually a form of tubercular teno-synovitis with melon-seed bodies.

*Treatment.*—The simple variety may be ruptured by pressure or opened by subcutaneous or open incision and drained. The compound variety should be opened by an incision above and below the annular ligament, with every antiseptic precaution, and subsequent rest on a splint.

#### DISEASES OF BURSEÆ.

Bursæ may be acutely or chronically inflamed.

*Acute Bursitis* is as a rule the result of injury. Suppuration is not infrequent. The symptoms and treatment present no special points.

*Chronic Bursitis* appears as a globular swelling containing either clear serous fluid, or a brownish fluid with melon-seed bodies (tubercular), or a deposit of fibrin giving it solidity.

The bursæ most commonly affected are that over the patella—housemaid's knee; that over the olecranon—miner's elbow; that





over the tuber-ischii—weaver's bottom; that over head of first metatarsal bone—bunion. The bursæ beneath the semi-membranosus, deltoid, and psoas often communicate with the joints in their neighbourhood, they should, therefore, be opened with caution.

When suppuration occurs in housemaid's knee the sac not seldom gives way subcutaneously on the outer side and the pus becomes diffused around the joint. It might be mistaken for arthritis. The history of the case and the position of the patella are the chief helps in diagnosis.

*Treatment of chronic bursitis* consists in—1st, Liniment of Iodine and pressure; 2nd, Incision and drainage; 3rd, Excision of sac.

#### DISEASES OF THE FASCIÆ.

Dupuytren's contraction of the palmar fascia consists in a cicatricial contraction and hypertrophy of the palmar fascia, especially of its prolongations on to the sheaths of the flexor tendons. The irritant is said to be pressure, or gout, or a specific organism.

The contraction begins in the ring or little finger and gradually extends to the others. It may be distinguished from contracted tendon by the engagement of the skin. *Treatment.*—The contractions may be stretched by manipulation, or by splints, or may be divided by multiple subcutaneous incisions, or a few open incisions.

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# INJURIES AND DISEASES OF BONE.

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## INJURIES OF BONE.

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FOR fractures which constitute the chief injuries of bone see p. 69.

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## DISEASES OF BONE.

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### INFLAMMATION OF BONE.

Anyone having a knowledge of inflammation as it occurs in soft parts, and who remembers that when it concerns bone it must originate in its vascular structures—the periosteum and medulla—and that it is called periostitis, osteo-myelitis or osteitis, according as it engages the periosteum, the central medulla or the medulla of the Haversian canal and cancellous spaces, will have only a few new terms and facts to learn in this chapter. As to terms, he should for gangrene read *necrosis*; for ulceration, *caries*; for fibroid thickening, *sclerosis*; and for slough, *sequestrum*.

When watching the progress and termination of inflammation of bone, he should observe how they are influenced by the direct vascular continuity of the periosteum and medullary membrane, by the unyielding nature of the osseous structures, and by the fact that the blood supply and growth of new bone is chiefly from the periosteum.

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The following are the names given to the various inflammatory processes occurring in bone:—

Periostitis	Simple (acute and chronic)	Septic	Infective	Tubercular
Osteo-myelitis	do.	do.	do.	do.
Osteitis	do.	do.	do.	do.

As terminations or continuations of the above processes we have necrosis, rarefying osteitis or caries, osteo-plastic osteitis, suppuration, and abscess.

#### SIMPLE INFLAMMATION OF BONE.

Purely simple inflammation, whether acute or chronic, of any of the structures of bones, like simple inflammation elsewhere, has but a brief and often doubtful existence. Acute inflammation of bone is usually either septic or infective, while chronic inflammation is usually tubercular, syphilitic, or rheumatic.

#### SEPTIC INFLAMMATION OF BONE

Is as a rule due to injury. The resulting suppuration and necrosis are usually local—superficial when the periosteum, central when the medulla is engaged.

*Symptoms.*—Those of acute local inflammation.

*Treatment.*—Antiseptic poultices and free incisions.

#### INFECTIVE INFLAMMATION OF BONE

Tends to become diffuse, and may be either *traumatic* or *idiopathic*.

The *traumatic* variety usually follows an amputation or a compound fracture that has not been kept aseptic, and begins in the medulla, through which the products of putrefaction when pent up are readily diffused. The infective process seems to start from the septic, whereupon thrombi form in the patulous veins of the medulla, and so the inflammation becomes general.

*Symptoms, local.*—There is suppurative inflammation after an amputation or other wound of bone. The inflammation spreads upwards with œdematous swelling and deep-seated pain and tenderness. The discharge increases and is usually offensive. The soft

parts retract, exposing the bone bare of periosteum, yellow and dead. The general symptoms are these of Septicæmia.

### ACUTE NECROSIS.

The *idiopathic* variety, called also "*acute necrosis*," "*bone typhus*," may have its starting-point either under the periosteum or in the medulla. It is an infective inflammation from the outset. Staphylococci are the organisms usually found. There being no wound, the mode of entrance of these organisms is a question of interest. The probability is that they existed in the system of the patient previous to the attack, and that some injury, perhaps so slight as not to be remembered, caused them to start an active existence in a particular bone.

The class of patients attacked favours this view. They are usually male children below the age of puberty, broken down in health, and often just recovered from Typhoid fever, Scarlatina, or other continued fever. Whether the disease starts in the periosteum or the medulla the periosteum is soon engaged, and pus forms beneath it, and strips it from the bone. In this way the entire bone, except the epiphyses, which have separate vessels in early life, may be deprived of its blood supply and perish.

*Symptoms.*—The condition of the patient makes one at the outset suspect the beginning of Typhus or Typhoid fever. After a few days, however, the parts covering the femur, tibia, or humerus, or other long bone, are found (the patient is often too ill to call attention to them) swollen, œdematous, and very painful on pressure. A little later the pale skin becomes dusky-red. Finally there is fluctuation; and in some cases crepitation at either or both ends of the bone indicates the separation of one or both epiphyses. The last named changes generally show themselves towards the end of the first week, about which time also pyæmia often becomes developed. In patients that recover there is necrosis of a part, or perhaps of the whole, of the shaft of the affected





bone. In some few cases resolution seems to take place in early stages of the disease.

*Diagnosis.*—It may be mistaken for one of the continued fevers, Cellulitis, or Acute Rheumatism.

*Treatment.*—For Infective Periostitis, early and free incisions through the periosteum and drainage with antiseptic dressings. For Septic and Infective Osteo-myelitis, in connection with an open wound, scrape out medulla and dress with iodoform, or amputate above through joint. Support strength with fluid nourishment and stimulants.

### TUBERCULAR DISEASES OF BONE.

*Tubercular disease of bone* may, like simple or septic inflammation, affect the periosteum, the central medulla or the medulla of the cancellous spaces; but it is most frequent in the last-named locality. In fact it is the chief cause of caries, as we see it affecting the spine, the ends of the long bones, and the tarsus and carpus. Tubercle is very prone to appear in the epiphyses of a growing bone (tuberculous epiphysitis), physiological activity being the predisposing factor.

*Tubercular caries or rarefying osteitis.*—Tubercular granulation tissue swells the cancellous spaces and establishes a rarefying osteitis, which, owing to the habits of tubercle (*vide* p. 95), is very liable to soften and break down.

*Tubercular periostitis* results in necrosis, owing to the formation of tubercular suppuration underneath the periosteum. It is met with most commonly in the ribs.

*Tubercular osteomyelitis.*—We have an instance of this condition in tubercular dactylitis. A caseous mass is formed in the interior of the bone, which becomes distended and often necrosed.

*Tubercular abscess* is met with commonly in upper and lower end of tibia and lower end of femur; and in other cancellous parts, tubercular granulation tissue, after causing absorption of the cancelli, cascates and breaks down, while the bone surrounding the softened mass, becomes sclerosed and shuts it in. If, however, the

abscess occurs in the neighbourhood of a joint, it will probably open into it, as cartilage, unlike periosteum, does not when attacked throw out a bulwark of bone.

*Symptoms.*—There is intermitting pain and tenderness in one particular spot, especially at night and after exercise, and enlargement of the bone in the neighbourhood. The long continuance of such symptoms justifies exploration, which will probably give relief even if no abscess is found. *Treatment.*—An exploratory drill, having defined an abscess, trephine, clear out the softened mass, and plug with iodoform gauze.

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### SYPHILITIC DISEASES OF BONE.

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*Syphilitic necrosis and caries* are always either directly or indirectly due to the characteristic lesion of syphilis—an overgrowth of connective tissue. This may occur either as an excessive sclerosis, obliterating the Haversian canals and thereby robbing the bone of its nutrition, or as a sub-periosteal gumma, softening and so playing a like part. For further particulars and treatment *vide* p. 100.

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### TERMINATIONS OF INFLAMMATION OF BONE.

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#### NECROSIS

Signifies the death of a visible portion of bone. It occurs more commonly in compact than in cancellous tissue, as the vessels of the former are more readily compressed by exudations. Its chief cause is suppuration beneath the periosteum or in the medulla, but everything that interferes with the nutrition of a part leads to it (*vide* gangrene, p. 55, and acute necrosis, p. 144). It seldom or ever occurs after simple fractures, however severe or comminuted, but is often met with in connection with the specific fevers, syphilis,





and phosphorus poisoning. The sequestrum may be *peripheral*, *central*, or *total*. It is usually of a dirty, dull, yellowish colour, and its margins, especially where latest attached, are spiculated, ragged, and eroded. It is separated from the living parts by the same process as is a slough (*vide* p. 55). It is, however, cast off with more difficulty, for it is usually found surrounded by a capsule of new bone produced by the periosteum. In this capsule there are openings (cloacæ) through which products due to inflammation and the disintegration of the sequestrum are discharged.

*Symptoms.*—The first symptoms of necrosis are those of the inflammation that produces it. When a sequestrum other than a peripheral one exists there is much thickening of the bone, and brawniness of the soft parts, in which are one or more sinuses leading down to cloacæ. The sinuses discharge pus, and probes, passed through them and the cloacæ, strike dead bone, which, if loose, may be moved to and fro. Occasionally necrosis may run an aseptic course and cause a swelling of the bone which may be mistaken for a tumour.

*Treatment.*—The sequestrum should be removed as soon as it is loose. To do this, after an Esmarch's bandage has been applied, a cloaca is enlarged; and the sequestrum is drawn out—divided into parts if necessary. The cavity is plugged with iodoform gauze before the removal of the Esmarch's bandage.

#### CARIES.

*Rarefying Osteitis or Caries* is another termination of inflammation; it is the equivalent of ulceration in soft part, and it follows the same course whether it takes place in cancellous or in compact tissue. In cancellous bone it is common; the vertebræ, tarsus, carpus, and ends of long bones being the parts most commonly affected. The following description may be applied to compact tissue by reading Haversian canals for cancellous spaces. When a spongy bone comes under the influence of a persisting and not too active irritant, there is inflammatory exudation into the can-

cellous spaces, which goes on to the formation of granulation tissue. As this new growth increases, it presses on the cancelli, causing their absorption; later, the enlarged spaces coalesce, and, finally, the entire of the engaged area may be one space occupied by granulation tissue.

Should the destructive process now cease, and the granulation tissue be partially absorbed and partially organised, we have an instance of *Caries sicca*. While these changes are going on, the weakened parts may at any time yield to pressure, and deformities occur. For instance, bodies of vertebræ may disappear, and those above and below become approximated.

Should the destructive process not cease, degeneration of the granulation tissue will take place, ending in abscess; and if it proceeds very rapidly the death of some parts may be too rapid for molecular disintegration, giving a combination of Caries and Necrosis, styled *Caries Necrotica*.

*Symptoms*.—Pain with œdema and swelling, and later, a sinus covered with a nipple of œdematous granulations and leading to soft and gritty bone.

*Treatment*.—Unless the disease is so extensive as to require excision or amputation, gouge away the carious bone with a Volkmann's scoop and plug with iodoform gauze.

#### OSTEO-SCLEROSIS.

*Osteo-plastic Osteitis*, or *Osteo-sclerosis*.—In this process, which is a very chronic one, the inflammation is of a plastic character. Granulation tissue is formed in the Haversian canals and cancellous spaces, as in rarefying osteitis, but in place of softening it ossifies. As a consequence, the bone becomes very dense, and the engaged canals and spaces are partially or altogether obliterated. These changes may in parts so interfere with the vascular supply as to cause necrosis. In many instances we find rarefying and condensing osteitis combined, just as in soft tissues we find hyperplasia in connection with ulceration.





*Symptoms.*—Deep-seated pain, worse at night, increased by exercise, and followed after a time by thickening of the bone.

*Treatment.*—Rest, leeches, blisters, and, in obstinate cases, linear osteotomy.

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### RACHITIS.

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A soft, pliable condition of the bones, resulting in deformities, and accompanied by general malnutrition.

*Pathology.*—The disease is characterised by changes affecting the epiphyses of long bones, and the margins of flat bones. “There is an increased preparation for ossification, but an incomplete performance of the process.” Crude fibrous tissue, in which calcareous salts fail to be deposited, accumulates at the epiphyses and goes to form the tuberoso swellings so characteristic of the disease. The periosteal bone is also laid down without calcification. The bendings that occur are not simply mechanical, but a process of growth consisting of interstitial increase on the side of least pressure, and of arrested growth or even absorption on the side of greatest pressure. The essential pathology of rickets is doubtful. Is it (1st) a metabolic defect in the osteoblasts; (2nd) a deficiency of earthy salts in the food; or (3rd) a non-absorption of these salts from the digestive tract? *Symptoms.*—The disease first shows itself usually in 2nd and 3rd years with restlessness, aversion to movement, gastric disturbance, tuberoso swellings of the ends of the long bones and of the ribs where they join the cartilage, and thickening along the cranial sutures. The bending of the bones occurs somewhat late, and is usually in the direction of their normal curves, as follows:—Pelvis flattened antero-posteriorly, femora curved forwards, tibia and fibula bent forwards and outwards (chiefly at junction of lower epiphyses); spine, at first a posterior, later a lateral or a lordotic, curve; thorax pigeon-breasted (from atmospheric pressure); head square, forehead prominent, dentition delayed and faulty.

*Treatment.*—Good hygienic conditions, good fresh, non-farinaeous food, cod-liver oil with phosphates of iron and lime, keep patient recumbent, correct deformities by splints or by osteotomy.

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### MOLLITIES OSSIUM.

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A rare disease, occurring in pregnant women, characterised by absorption of the earthy constituents of the bones, which, in consequence, easily bend and break. The pathology is not known. *Treatment.*—Oöphorectomy has yielded good results; no other remedy is known.

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### ACROMEGALY.

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There is, in this disease, symmetrical enlargement of the bones of the hands, feet, head, and face. Nothing is known of the pathology and no treatment is effectual.

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### TUMOURS OF BONE.

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Almost any tumour may occur in bone, but the great majority of innocent tumours in this locality are either exostoses or enchondromata, and all the primary malignant tumours are sarcomata (*vide* pp. 107–116).

Sarcoma of bone is so serious and common a disease, and early diagnosis is so important, that special mention of it is necessary. It may be of any of the varieties of sarcoma; it generally occurs in the neighbourhood of large joints, and it may begin either as a periosteal or central growth. The periosteal variety is met with as a rapidly-growing, painless, semi-fluctuating tumour, which may be mistaken for a cold abscess. But on full examination it is found





to have a rounded edge, to be adherent to the bone, to be of unequal consistency, and false as regards general fluctuation. From disease of the neighbouring joint it may be distinguished by observing the exact relationship of the swelling to the joint, which, however nearly it is approached, is seldom involved by sarcoma.

*Central Sarcoma* begins in the central medulla, with boring pain resembling that of osteitis. It is generally of the myeloid form, of slower growth and less malignant than the periosteal. As it grows it expands the bone, which, in advanced cases, yields an egg-shell crackling, diagnostic of the disease. When it has broken through its shell its growth becomes very rapid. In some cases, if only one side of the bone is destroyed, and there remains a bony easement on the other side, the tumour, when highly vascular, will yield a pulsation much resembling aneurysm. This phase of the tumour constitutes in most cases the disease known as osteo-aneurysm, or pulsating tumour of bone. Treatment.—Amputation, and not through the bone affected.

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## DEFORMITIES OF BONE.

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### GENU VALGUM, VARUM, AND RECURVATUM.

*Genu Valgum* or *Knock Knee*. *Causes*.—1st., Rickets in early life. The internal condyle is displaced downwards by the process of growth that occurs in rickets—viz., an interstitial increase on the side of least pressure, and of arrested growth or even absorption on the side of greatest pressure; 2nd, later in life, about puberty, relaxation of the ligaments and occupations, putting strain on the joint. Treatment.—Suitable splints and constitutional treatment; after the age of ten supra-condyloid osteotomy by Macewen's method if other treatment fails.

*Genu Varum*, or *Bow-legs*, and *Genu Recurvatum*, if we except shape, are identical in pathology with *Genu Valgum*, and should be treated on the same principles.

## TALIPES OR CLUB FOOT.

As a congenital deformity, four varieties are spoken of—Equinus, Calcaneous, Varus, and Valgus—but we meet with it practically in only two forms, combinations of the foregoing varieties—viz., Talipes Equino-Varus and Talipes Calcaneo-Valgus. The deformity is probably a faulty development, the result of mal-position in utero. Talipes equino-varus is far and away the most common form. It generally affects both feet but it may be confined to one—the right oftener than the left. The sole of the foot is turned towards the median line of the body and the heel is more or less drawn upwards. In severe cases when the foot has been walked on the sole looks backwards and upwards and a bursa forms over the dorsal surface of the cuboid. The deformity being a persistence of an early foetal position, all tissues have been moulded to what cannot be called a new condition, consequently, all from skin to bone, inclusive, have to undergo correction by treatment. Treatment, *Manipulative, Mechanical, Operative*.—*Manipulative*: The leg is grasped above the ankle by one hand while the other carries the foot into a correct position. This treatment should be learned by the mother, commenced at the very first and continued for years. *Mechanical*: Various appliances are in use of which a plaster-of-Paris bandage, fixing the foot in a position tending to eversion, is the best. *Operative*: The only tendon that is now divided individually is the tendo-Achilles. For severe cases Phelps does this additional operation which indicates the structures chiefly engaged:—He makes a free vertical incision along the fold of skin indicating the astragalo-scaphoid articulation, laying open that joint and dividing all intervening and tense structures. These include both tibial tendons, the inner part of the plantar fascia, the front portion of the internal lateral ligament of the ankle and the inferior calcaneo-scaphoid ligament. Other operators correct the deformity by removing a wedge of bone from the tarsal arch. In all cases relapse must be guarded against by attention to the part for some





years. *Other Varieties* of congenital talipes are rare, and may be treated on the same lines.

*Acquired Talipes* is the result of infantile paralysis, or of weakness of ligaments. It includes besides the varieties mentioned, *pes planus* or *flat-foot* and *pes cavus* or *hollow-foot*. Treatment consists in division of offending tendons, and the use of various surgical appliances such as a steel artificial arch in *pes planus*.

#### HAMMER-TOE.

The deformity is indicated by its name. It is due to a shortening of the lateral ligaments towards the plantar side. The second toe is that usually engaged. The treatment is excision of the head of the first phalanx.

# INJURIES AND DISEASES OF JOINTS.

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## INJURIES.

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*Contusions.*—Joints are liable to contusion, and as a result they may become inflamed (*vide* arthritis p. 156) or distended with blood hæmarthrosis. *Treatment.*—Rest on a splint; cold applications; aspiration if there is much distension.

*Sprains* occur most frequently in the ankle, wrist, and knee. There is a stretching or tearing of the ligaments, and occasionally of neighbouring tendons and other soft parts, but the bones are not displaced. *Symptoms.*—Pain, severe and increased by movement, loss of power, swelling, and ecchymosis. A sprain is a very tedious accident, often followed by weakness, stiffness, and even ankylosis. *Treatment.*—Rest on a splint, cold by ice bags or Leiter's tubes, leeches in some cases; later, bandages, liniments, massage, and douches.

*Dislocations.*—*Vide* p. 84.

*Wounds.*—The ordinary classification of wounds applies to those of joints. An escape of synovial fluid is, of course, a proof that the joint is open. Doubtful cases should not be probed. The danger of these wounds is septic arthritis. *Treatment.*—Where the bones are injured, an attempt may be made with the help of resection, to save most limbs if the chief blood-vessels and nerves have escaped injury. The upper extremity is especially amenable to conservative surgery.

All joints opened accidentally, unless there is reason to think that the wound is a clean one, should be treated antiseptically.





The wound and the joint in all its cavities should be thoroughly cleansed with a 1 in 20 carbolic solution, or a 1 in 1000 perchloride of mercury solution, and it should be well drained. For these purposes the original wound should be enlarged when necessary, and fresh openings made in suitable localities. The limb should be firmly fixed on a splint arranged so as not to interfere with drainage, and an antiseptic dressing applied. At every rise of temperature the drainage question should receive fresh consideration. Wounds, which may have opened a joint, should be thoroughly cleansed, dressed with an antiseptic poultice, and rested on a splint (*vide* p. 29).

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### DISEASES OF JOINTS.

The following structures are liable to be engaged:—Synovial membrane, cartilage, bone, ligament.

When disease engages the synovial membrane only, it is called synovitis; when it extends to the other structures, arthritis is the name employed. The chief causes of disease in this locality are injury, exposure to cold, sepsis, tubercle, rheumatism, gout, gonorrhœa, syphilis.

#### SYNOVITIS.

This term is, as a rule, applied only to serous inflammations, for suppurative inflammation quickly spreads to other structures, and so comes under the head of arthritis. It may be acute or chronic.

*Acute Synovitis.*—*Causes.*—Injury, exposure to cold in gouty or rheumatic subjects, gonorrhœa. *Symptoms.*—The joint is painful, hot, and distended. In the knee the swelling is most noticeable underneath the vasti for three or four inches above the patella; in the ankle, on each side the tendo-Achilles; in the elbow, underneath and at each side of the tendon of the triceps; in other joints, as a general swelling. The effusion is limited to the synovial cavity; there is no œdema. The joint is semi-flexed. There is more or less constitutional disturbance.



differ only, by their intensity, from those of acute serous synovitis. When a large joint is engaged, the constitutional disturbance is such that the patient may die, during the first week, of ptomaine poisoning. Later there are signs of the disorganisation of the joint, and of an acute suppuration running the course above indicated. *Diagnosis*.—Abscesses of bursæ in neighbourhood of joint may be mistaken for suppuration within the joint.

*Treatment*.—At first that of acute synovitis. On the suspicion of suppuration an aspirator should be used to clear up the doubt, and if pus or sero-purulent fluid is found it should be liberated by free incision in suitable places, and thorough drainage. As ankylosis often results, the limb should be secured in a useful position—bent for the elbow, straight for the knee.

#### TUBERCULAR ARTHRITIS.

*Tubercular Arthritis*, also called white swelling and pulpy degeneration of the synovial membrane (*vide* Tuberculosis, p. 95), may begin either in the synovial membrane or in the bone, never in the cartilage. In *primary tubercle of the synovial membrane* this membrane is at first congested and swollen, and later undergoes pulpy thickening to a marked degree. From the synovial fringes granulation tissue creeps like ivy over the cartilages, pitting and perforating them here and there and starting in the bone a rarefying osteitis. In advanced cases every crevice of the joint is filled with granulation tissue in various stages of development and degeneration. Similar changes occur in the tissues round the joint, giving them on section a lardaceous appearance. The skin remains white throughout, but is adherent to, and often perforated by, the fungous growth. When the disease begins in the bone, the case is one of tubercular osteitis engaging the joint. As soon as the synovial membrane is engaged, the process just described is started. It is not possible as a rule to locate the primary focus clinically.

*Symptoms*.—The disease begins very insidiously, perhaps after a trivial injury, with slight swelling, stiffness, weakness, and pain of



spines cannot be brought simultaneously in contact with a flat surface.

The pathological condition of the joint at this stage is one of inflammation with more or less effusion, and without softening of ligaments. In consequence the patient carries the limb in the position of greatest relaxation of the capsule, and the muscles fix it so. The same condition and the relation of the psoas muscle to the inflamed joint accounts for the lordosis. The apparent lengthening is due to a tilting of the pelvis downwards and forwards to correct the shortening due to the flexion and abduction of the thigh.

2nd Stage.—*Apparent Shortening*.—There is *flexion, adduction, and inversion* of limb. At this stage the ligaments have become softened and partially destroyed. The change in position is probably due to the capsule giving way at its posterior—its thinnest part—and to the position of the patient in bed when he can no longer lie on the affected side. The apparent shortening is due to the efforts of the patient to keep the adducted leg parallel with its fellow when moving about. This can only be done by tilting the pelvis upwards on the affected side.

3rd Stage.—*Real Shortening* due to destruction of the head of the bone or of the acetabulum; or to dislocation. The malposition of 2nd stage is increased. During the 2nd and 3rd stages, though dry caries is not unknown, suppuration usually occurs, and abscesses form in the neighbourhood of the joint.

*Treatment*.—Rest and correction of malposition by means of a weight and pulley, or Thomas's splint, combined with the general treatment of tuberculosis. Excision, except for the removal of necrosed bone, yields disappointing results.

*Tubercular disease of the sacro-iliac joint* also requires special mention. It is a disease of adults; somewhat rare. The patient feels as if he were falling asunder, and all movements that compress or strain the joint cause pain. He walks lame, leaning on the sound side, while on the other side the leg seems longer, and

the anterior superior spine of ilium is lower and more prominent. There may be local signs of tubercular changes. When abscesses form they may be intra- or extra-pelvic. In the former case they may open through the sciatic notch, alongside the rectum, or into the bowel.

*Treatment.*—When possible clear out the disease by means of chisel and flushing gouge; when not, support pelvis with leather band, and treat constitutionally for tuberculosis.

### CHRONIC RHEUMATIC ARTHRITIS, RHEUMATOID ARTHRITIS, CHRONIC OSTEO-ARTHRITIS, ARTHRITIS DEFORMANS.

It is a disease of middle age. It may be non-articular, in which case it limits itself to the large joints as a rule—the hip in males, the knee in females—or poly-articular when it is found in the medium or smaller joints, notably those of the digits. *Pathology.*—Its essential pathology is not known. The term rheumatoid is misleading. It is characterised by—1st, proliferation and subsequent destruction *without suppuration* of the articular cartilages; 2nd, eburnation and wearing away of the ends of the bones; 3rd, the formation of ecchondroses and osteophytes (the latter have been compared to the guttering of a wax candle), and hypertrophy of the synovial membrane.

*Symptoms.*—The affected joint is deformed, masses of bone are felt around it, it is partially ankylosed, it grates, and is painful on movement. There is an absence of inflammation.

*Diagnosis.*—The age of the patient distinguishes it from tubercular disease. In the hip it may be mistaken for intra-capsular fracture: in the shoulder for dislocation.

*Treatment.*—Mineral waters and baths, massage, suitable support by surgical appliances.

### CHARCOT'S DISEASE, OR ATAXIC ARTHROPATHY.

A disease occurring in persons affected with sclerosis of the posterior columns of the spinal cord, and much resembling chronic





rheumatic arthritis, from which it is to be distinguished, 1st, by its sudden onset; 2nd, by considerable swelling of the joint due to effusion; 3rd, by the rarity of osteophytes; 4th, by the co-existence of other symptoms of locomotor ataxia. *Treatment*.—That of locomotor ataxia, with support of the affected parts.

### ANKYLOSIS.

Ankylosis may be fibrous or osseous. Fibrous ankylosis is dependent on fibrous adhesions and bands within the joint, on thickening of the capsule, and on shortening of the ligaments and muscles on the side of flexion. These may be associated in various degrees. In osseous ankylosis the bones may be united completely as after excision of knee, or by bridges of osseous tissue.

*Diagnosis*.—A slight degree of movement, and of pain on attempted movement indicates fibrous union. An anæsthetic is often necessary in doubtful cases.

*Treatment*.—Fibrous stiffness is corrected by massage and passive movements; surgical appliances; breaking down adhesions and dividing contracted tendons under an anæsthetic, the limb after the operation being placed in a suitable position on a splint, and ice applied for a few days, after which passive motion and massage should be employed.

Bony ankylosis is best left alone when the limb is in a good position, except in the case of the elbow, when a resection may be done if the patient desires very much a movable joint. If the limb is not in good position, an osteotomy may rectify the fault.

### NEURALGIA OF JOINTS

Is sometimes met with in young women of a nervous temperament and may simulate organic joint disease. It may be altogether hysterical, or it may be due to pressure on a nerve of which the affected one is a branch. Thus intra-pelvic pressure on the obturator nerve may excite pain in the knee.

*Diagnosis*.—Pain is the chief symptom, and many of the physical signs of organic disease are absent.

*Treatment*.—Treat the cause.

## LOOSE BODIES IN JOINTS.

Two kinds.—1st. Melon-seed bodies, usually numerous, found commonly in ganglia and bursæ. They are fibrinous exudations, the outcome of a very chronic inflammation, probably tubercular. 2nd. Loose cartilages, met with most commonly in the joints of the knee, elbow, and lower jaw. These are either pieces of articular cartilage accidentally knocked off, or detached synovial fringes in which cartilage has been developed.

*Symptoms.*—The melon-seed bodies give rise to creaking, swelling, and weakness, but not to pain. A loose cartilage, when in any movement of the joint it gets between the opposing surfaces, causes pain of an intense kind and arrests movement. When it is lying in any superficial pouch of the synovial sac, it can be felt.

*Diagnosis.*—The sudden pain and loss of movement caused by a loose cartilage may be mistaken for that due to a displaced inter-articular cartilage, but the former at once passes away, for the loose cartilage seldom remains jammed, but the latter persists till the displacement is corrected (*vide* dislocations, p. 93).

*Treatment.*—The palliative treatment consists in limiting the movements of the loose body by strapping or bandage. The operative treatment is removal of the loose body by direct incision, it being previously secured, by transfixion or otherwise, in some superficial position.

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# INJURIES AND DISEASES OF THE HEAD.

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## GENERAL CONSIDERATIONS.

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THE following anatomical and physiological considerations have a special bearing on injuries and diseases of the head:—

1st.—The vascular supply of the scalp. The vessels lie between the skin and the aponeurosis and are firmly adherent to the rigid fibrous tissue in their neighbourhood, consequently they are contained in any flap that may be raised; they bleed freely because they cannot retract; and they are with difficulty secured.

2nd.—The patulous condition of the veins of the diploë favours septic thrombosis.

3rd.—The various plains of tissue underneath which septic matter may be diffused—viz., the scalp, the periosteum, the cranium, the dura mater, the arachnoid.

4th.—The shape and construction of the cranium, its unyielding nature, and the physical effects of blows on it.

5th.—The general anatomy and physiology of the brain, including the localisation of its functions and its topography in relation to the skull.

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## TOPOGRAPHY OF THE BRAIN IN ITS SURGICAL RELATIONS.

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There are certain regions of the brain the functions of which are known. The fissure of Rolando, or, as it is sometimes called, the sensori-motor area, is one of special importance.

In order to mark out on the surface of the head this region and others which the surgeon may require to reach, the following lines and methods are in use :—

*Reed's Base Line*—A line drawn from the lower margin of the orbit straight backwards through the centre of the external auditory meatus makes a convenient base from which to take measurements.

*The fissure of Rolando* is marked by a line  $3\frac{3}{8}$  inches, drawn at an angle of  $67^\circ$  downwards and forwards from a point half an inch behind the centre of a line going from the glabella (the smooth swelling between the eyebrows) to the external occipital protuberance.

*The anterior branch of the middle meningeal artery* may be located thus—Draw backwards from the external angular process of the frontal bone a line of any length between 1 inch and  $2\frac{1}{2}$  inches, and through its termination draw from the zygoma a vertical line of equal length. The point where this second line ends is over the artery. This artery is also marked by a point  $2\frac{1}{2}$  inches vertically above the condyle of the lower jaw.

The *lateral sinus* may be reached at a point  $1\frac{1}{8}$  inches behind the centre of the bony meatus and on the level of its upper border.

*Temporo-sphenoidal abscess* may be reached by placing the pin of a trephine at a point  $1\frac{1}{4}$  inches behind, and  $1\frac{3}{4}$  above, the centre of the bony meatus.

*Abscess of cerebellum*, trephine 1 inch below Reid's base line, and 2 inches behind the centre of the meatus.

The *mastoid antrum* is reached by sending a  $\frac{3}{4}$  inch drill straight inwards for  $\frac{3}{5}$  of an inch, at such a point that the hole it makes shall





lie as near as possible to the back of the bony meatus, and its upper border not more than  $\frac{1}{12}$  of an inch above the level of a line prolonged backwards from the superior margin of the meatus.

*The tentorium* is marked by a line drawn from a point half an inch above the occipital protuberance forward towards a point half an inch above the centre of the meatus.

## INJURIES OF THE SCALP AND CRANIUM.

### CONTUSIONS.

The points to be noted are, that there is little liability of the injured part to slough, and that hæmatomata often form. Hæmatomata are specially frequent in newly-born children—the result of injury at birth. They may form immediately under the aponeurosis, or in rare cases under the periosteum, where they are limited by the attachment of that membrane to the sutures. In this latter locality they are not unlike a depressed fracture, the uncoagulated blood in the centre of the swelling simulating a depression. The coagulated blood, however, can be felt as a surrounding elevation, and can be indented by the finger-nail, and so a diagnosis made. The treatment presents nothing special.

*Contusion of the Cranial Bones* may result in almost any of the complications or sequelæ of injuries of the skull to be dealt with later on. The commonest are—necrosis of the part struck; suppuration either intra-cranial or in the diploë; laceration of the brain, usually on the side opposite to that struck.

### WOUNDS OF THE SCALP

Are divided into—

- 1st. Wounds not penetrating the aponeurosis;
- 2nd. Wounds penetrating the aponeurosis;
- 3rd. Wounds denuding the bone.

Class 2nd is important, owing to the danger of diffuse suppuration, which, it should be remembered, may be mistaken for cutaneous erysipelas. It is to be distinguished from that disease by noting that the characteristic invasion and sharply-marked margin of erysipelas are absent, and that the swelling and redness do not extend beyond the area of the occipito-frontalis.

In Class 3, exfoliation of the outer table, septic inflammation of the diploë, and intra-cranial suppuration may occur conjointly or independently.

*Treatment* consists in the wide and thorough disinfection of the neighbourhood of the wound and the wound itself (*vide* p. 64). This cannot be done without shaving a considerable area. All partially detached flaps should be replaced; the edges of the wound should be adjusted with sutures, but not too closely, and drainage employed where asepticity is doubtful. In severe cases the bones should be examined by the finger before the wound is closed. If pus forms it should be evacuated at once, free incisions being made where necessary. The general treatment consists in rest, purgation, and low diet.

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## FRACTURES OF THE SKULL.

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*Fractures of the Skull* are divided into those of the vault and those of the base.

### FRACTURES OF THE VAULT

Are usually due to direct violence. Sometimes, but rarely, they occur at a point opposite to that struck (*contre coup*). The following terms describe the kinds of fracture met with:—*Simple, compound, comminuted, depressed, partial, punctured, fissured, stellate*. They are of importance, chiefly in so far as they are likely to be accompanied by injury of the contents of the cranium.

*Diagnosis*.—Only by a consideration of general and local symptoms can a diagnosis be made. The general symptoms are those produced





by injury to the brain or its membranes. The local symptoms are—depression of the bone, swelling of the scalp with tenderness, and in the case of compound fracture such indications as a probe or finger introduced into the wound may give.

*Treatment.*—An ice cap to the head shaven and rested on a hard pillow, a calomel purge or turpentine enema, a quiet, dark room and low diet. If patient is unconscious attend to the state of bladder twice daily, and give nutrient enemata if for twelve hours he is unable to swallow. The above, to prevent repetition, will be referred to hereafter as the “ordinary” treatment of head affections. In simple fractures trephine and raise the bone if it is markedly depressed. Also, owing to the frequency of injury to brain, by *contre coup*, trephine and explore any site indicated by symptoms of local compression of brain. In compound fractures, as a rule, trephine at the seat of fracture. It enables one to cleanse and drain the wound properly. Remember that in such cases the discharges beneath the bone and membranes when torn, are one with the discharges on the surface and will undergo the same changes. In punctured fractures always trephine, and let trephine include the injured bone in the bit removed. In some cases a chisel, gouge forceps or elevator will work better than a trephine.

#### FRACTURES OF THE BASE.

*Causes:* 1st, fissure extending from point struck; 2nd, a fall upon the feet or nates causing impact of spine on condyles of occipital bone; 3rd, *contre coup*.

*Symptoms.*—Those of grave injury to the brain or cranial nerves, in conjunction with the escape of brain matter, cerebro-spinal fluid, or blood. These discharges may take place through the ear, nose, or mouth, indicating fissure in the petrous portion of the temporal, the roof of the nasal fossa, or the basilar process. Moreover, effused blood may show itself under the conjunctiva, behind the mastoid, and at the back of neck. Hæmorrhage is never positive evidence of fracture, but it is presumptive if it is considerable and

lasts for some hours. The ecchymosis of the eye, characteristic of fracture, does not appear for a day or two, and then with a slight protrusion of the eye ball it is seen spreading forward under the conjunctiva, and into the lower lid from the external margin of the orbit.

*Prognosis* always bad. There is great liability—1st, to injury of important nervous centres; 2nd, to injury of sinuses and arteries; 3rd, to sepsis, from fissures opening into ear, nose, or mouth.

*Treatment*.—The general treatment is the same as that of fracture of the vault. Septic meningitis is the danger to be guarded against, and, therefore, fissures opening into the ear, pharynx, or nostrils, should be kept as far as possible aseptic, by means of antiseptic sprays, lotions, and powders.

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## INJURIES OF THE BRAIN.

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There are three *primary states of functional disturbance* indicating injury—1. Concussion. 2. Compression. 3. Cerebral irritation.

### CONCUSSION

Is a condition immediately following a blow on the head, in which there is sudden loss of consciousness with weakness of the heart's action and of the respiratory muscles.

*Pathology*.—There are three theories—1. Anæmia of the brain, produced, according to Duret, as follows:—There is at the point struck a “cone of depression,” and at a point opposite a “cone of bulging” of the cranial wall. A wave of cerebro-spinal fluid is thereby produced, which causes distension of the fourth ventricle and stimulation of the restiform bodies. 2. Molecular disturbance due to vibration. 3. Minute laceration of brain with multiple hæmorrhages. Duret, however, says that these hæmorrhages are due to a wave in the cerebro-spinal fluid which robs the vessels, that rupture, of their normal support.





*Symptoms, Stage of Collapse.*—The collapse may vary from a state of unconsciousness and pallor, lasting a few seconds, to one of profound insensibility from which the patient never recovers. The following are the symptoms of a medium case:—Pallor and coldness, temperature about 97, pulse weak and variable in rate, respiration slow and shallow, with an occasional sighing inspiration; the pupils are as a rule equal, and react to light; the patient is insensible, but can be aroused; the limbs are flaccid; the sphincters of rectum and bladder are relaxed, but these organs can expel their contents. *Stage of reaction* sets in after a few minutes or a few days, often with vomiting. The surface becomes warm, pulse full, temperature rises to about 99°, consciousness returns, and, if there has been no contusion or laceration of the brain, convalescence becomes quickly established.

*Treatment.*—Rest in a warm bed; with, if reaction is delayed, gentle massage and enemata of beef tea.

## COMPRESSION.

### (Laboratory Experiments.)

The following vital phenomena are induced when the pressure of the cerebro-spinal fluid is artificially increased:—

1st. Pain—Due probably to a stretching of the dura mater, and to anæmia of the brain.

2nd. Convulsions. These are often absent when the pressure is slowly increased.

3rd. Slowness of the pulse, due to stimulation of the vagus centres in the medulla. When the case is approaching a fatal termination and these centres become paralysed the pulse quickens.

4th. The respiration becomes deep and slow, with a tendency to irregularity.

5th. The pupils at first contract and then dilate and become immobile. Irregularity between the pupils is accounted for by the

pupil on the side of the compressing agent going through the above changes earlier than that on the opposite side, or to inflammatory effusion specially affecting, on one side, the nerves that regulate the pupil.

6th. Early loss of consciousness.

*Compression* of the brain may be local or general. Both conditions are, as a rule, combined in the compression due to injury, that is, the compressing agent—a depressed portion of bone, a foreign body, extravasated blood, serous or purulent exudation, &c.—acts directly on the nervous tissue in its neighbourhood, and also, by lessening the cranial capacity, increases the pressure to which the brain, or rather the entire central nervous system, is subjected by the subarachnoid fluid.

*Symptoms*, as a rule, come on gradually, and tend to grow worse. They follow quickly when the injury is from depressed bone; during first 24 hours when from extravasated blood; on third or fourth day when from inflammatory exudation. They are *headache*, and *drowsiness*, gradually passing to *unconsciousness*, from which, however, till it is complete, the patient may be aroused; *paralysis*, sometimes unilateral at the outset, but soon becoming general and profound; *pupils* often irregular at first, finally becoming dilated and immobile; *temperature* sub-normal at first, but raised later on; *pulse* full, slow and laboured; *breathing* slow and deep, with a blowing of the lips; *continence* of fæces and *retention* of urine, which, however, overflows when the bladder is slightly distended; disappearance of reflexes. The *Diagnosis* between concussion and compression must be made by a general consideration of the case and its history. It should be remembered that concussion often masks the early symptoms of compression and then merges into it. A gradual onset, a tendency to grow worse, and symptoms pointing to a unilateral compressing agent, such as increased paralysis and temperature on one side, and irregularity of the pupils, distinguish





compression in its early stages. When fully established it is marked by the profoundness of the coma and paralysis and by the special characters of the respiration and pulse.

Both compression and concussion have to be distinguished from insensibility due to alcoholic and narcotic poisoning, sun-stroke, exposure to cold, and uræmia. The history of the patient and distinctive symptoms will clear up many cases, but all doubtful cases should be kept twenty-four hours under observation before an opinion is given.

*Treatment*—"Ordinary," of head injuries. Venesection is often useful when breathing is very laboured. When the cause of the pressure is apparent and its removal practicable, do the necessary operation without delay.

#### CONTUSION AND LACERATION OF BRAIN.

Contusion and laceration of the brain may occur directly from any blow, the weapon, or the bone it depresses, causing the laceration. The nature of such injuries is clear, but the majority of lacerations or contusions occur indirectly, often without fracture, and usually at a point exactly opposite to that struck. One explanation of this is that "the blow starts a wave in the soft cerebral substance, which breaks against the bone on the opposite side." Another, that of Duret, considers that the "cone of bulging," which forms opposite to the point struck, diminishes the support of the cerebro-spinal fluid to the vessels, under which condition the walls of the vessels cannot withstand the blood-pressure from within and they rupture. Many lacerations occur in the anterior part of the frontal and in the temporo-sphenoidal lobe, owing to the unevenness of the skull in these localities, and their position opposite to points very liable to injury.

*Symptoms*.—Convulsions, irregular and localised spasms, or paralysis, prolonged insensibility without coma, and the condition known as cerebral irritation, point to contusion or laceration of brain. These symptoms are, however, as a rule at first masked by

those of concussion and compression, and sometimes at a later date, by those of septic meningo-encephalitis.

*Cerebral Irritation.*—Is a name applied to a set of symptoms, which occur usually as the result of laceration of the frontal lobes of the brain. The patient lies restless and invariably curled up, the eyelids are firmly closed, the pupils, which it is difficult to get a look at, are contracted, the surface is pale and cold, the pulse slow and weak. The state of the temper is, however, the characteristic symptom. He lies unconscious, but when aroused turns away with much irritability and bad language. Recovery is slow and very often incomplete.

*Treatment.*—Contusions and lacerations of brain, the result of direct injury, are dealt with in connection with the injuries that produce them. Those without an open wound require the same treatment as concussion.

#### INTRA-CRANIAL HÆMORRHAGE.

The blood may be extravasated between—1st. The dura mater and the skull. 2nd. In the sub-dural space. 3rd. In the sub-arachnoid space. 4th—In the substance of the brain or in its ventricles. In the first-named situation it usually proceeds from a ruptured meningeal artery or a torn sinus, in the last three the vessels of the pia mater or of the substance of the brain are the source.

*Causes.*—Fractures of the skull and lacerations of the brain, either direct or indirect.

*Symptoms.*—Gradually increasing insensibility ending in coma.

An injury that causes hæmorrhage usually causes concussion as well. If bad enough to cause hæmorrhage by laceration of brain the concussion will not pass away, but if the hæmorrhage is only between the dura and bone there is as a rule a return of consciousness, and then as the hæmorrhage increases, with reaction, coma gradually supervenes. Protrusion of eyeball and wide dilatation of pupil on one side after an injury, indicate rupture of the anterior branch of





middle meningeal artery on the same side. In many cases, hæmorrhage from injury can be distinguished from apoplexy only by the history of the case.

*Treatment.*—The general treatment is that “ordinary” to all injuries of head. Trephining is applicable only when there are symptoms that indicate the position of the extravasation. If after trephining the blood wells up profusely, though the opening made and the bleeding point is not to be found, all that can be done is to put the patient sitting upright, compress the carotid, and apply ice.

#### TRAUMATIC, INTRA-CRANIAL INFLAMMATION.

Inflammation within the cranium, though sometimes localised, as a rule engages both the membranes and the brain—meningo-cncephalitis. It is usually septic, the result of a compound fracture, mostly with, sometimes without wound of the dura mater; or of an injury that without fracture starts a septic osteitis or phlebitis.

*Morbid Anatomy.*—Semi-purulent lymph is found deposited on the surface of the brain and in the membranes. The membranes and substance of brain are injected, the ventricles are filled with blood-stained serum.

*Symptoms.*—Febrile disturbance accompanied by great headache, intolerance of light and noise, restlessness, vomiting, delirium, and occasionally convulsions. Optic neuritis is found on examination with ophthalmoscope. This group of symptoms will hereafter be referred to as “head symptoms.” At a later stage these symptoms pass into those of compression.

*The treatment* is that “ordinary” in head affections. Trephining with a view to drainage has as yet been disappointing in its results except when the inflammation was local.

#### INTRA-CRANIAL SUPPURATION.

Suppuration within the cranium occurs chiefly as a result of septic injury, or as a complication of chronic suppuration of middle ear. The abscess may be—1st, Extra-dural; 2nd, sub-dural or intra-meningeal; 3rd, Cerebral.

*Traumatic extra-dural abscess* occurs beneath the seat of a septic injury that has not opened the dura mater. Where there is no fracture the suppuration is due to a septic process spreading from the diploë along the small vessels. It may be diagnosed by what we have arranged to call "head symptoms," combined with an unhealthy state of the wound where there is one, or with a localised œdema "Pott's putty tumour," when the wound has healed, or where there was only a bruise originally.

*Intra-meningeal abscess* is a termination of septic meningitis. Rigors indicate the formation of pus.

*Cerebral abscess* may be acute or chronic.

The acute form occurs superficially at the seat of injury as a part of a general meningo-encephalitis.

The chronic form is situated in the white matter; it forms late, and how it forms is doubtful. It is usually connected either with injury or suppuration of middle ear. The symptoms are peculiar. The pulse is slow, often as low as 40; the temperature is sub-normal; there is vomiting, headache, drowsiness, and optic neuritis. In the absence of "localising symptoms" the seat of injury is the guide to the abscess.

*Treatment.*—Give free exit to the pus wherever situated, trephining freely when necessary. The condition of bone will often indicate the condition of underlying parts. If the dura mater bulge into wound without pulsation make an opening in it.

#### DISEASES OF THE HEAD ARISING FROM SUPPURATIVE DISEASE OF THE EAR.

As a result of suppuration in the middle ear pus may form in the mastoid cells, between the dura mater and either the roof of the tympanum or the posterior surface of petrous bone, in the lateral sinus, in the cerebrum, or in the cerebellum. In the cerebrum the pus often lies deeply in the temporo-sphenoidal lobe, in a space included, according to Barker, between two vertical lines—one through the tragus, the other two inches further back. In

the cerebellum the pus lies in the anterior part of the lateral lobe. Pus in these localities (excepting the substance of the brain where abscess presents the symptoms already mentioned) is indicated by more or less septic intoxication, and local pain and tenderness. In addition, local œdema may point to mastoid abscess; great oscillations of temperature and induration along course of internal jugular, to thrombosis of lateral sinus; and headache, vomiting and optic neuritis, to extra- and intra-dural collections of pus.

*Treatment.*—Open up the mastoid cells fully, and according to the indications there found, and the general symptoms, follow the septic ramifications and drain thoroughly. In doing so it may be necessary to trephine in more than one locality, and to ligature the internal jugular with a view to clearing out the lateral sinus. The condition of the middle ear should be looked to and treated at same time.

### [SEQUELÆ OF INJURIES OF THE HEAD.

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#### HERNIA CEREBRI

Is the name given to a fungous mass of brain substance infiltrated with inflammatory products that protrudes at times through a wound in the dura mater. Inflammatory œdema of brain, and anything else that increases intra-cranial pressure, leads to it.

*Treatment.*—Slice off the protuberance and apply an aseptic pad. This is often unsatisfactory in its results, but it is all that can be done.

#### TRAUMATIC EPILEPSY—

A form of Jacksonian epilepsy—is met with following injury of the head, and due to cicatricial conditions in the scalp, cranium, meninges, or brain. The removal of the offending scar, even when situated in the brain substance, has been followed by good results.

## DERANGEMENTS OF THE MENTAL POWERS

And of the organs of special sense, sensory and motor paralysis, neuralgia and headache, are also sequelæ of injuries of head, which, when the disturbing cause can be localised, may be treated by trephining—otherwise by ordinary remedies.

## TRAUMATIC GLYCOSURIA.

As a result of injury to the head, sugar is sometimes present in the urine from a few days after the accident for a week or more. In such cases the glycogenic centre in the medulla has probably been disturbed by the injury. It is a matter of interest rather than importance.

## TUMOURS (GLIOMATA AND CYSTS),

And growths due to syphilis, tubercle, and injury, have been successfully removed from the brain. The *Symptoms* are *progressive* headache, vomiting and optic neuritis, with Jacksonian epilepsy, or paralysis. The nerves engaged by the paralysis and the starting point of the epileptic seizure help to locate the tumour.

## HYDROCEPHALUS

May be congenital or acquired, acute or chronic. The fluid is usually in the ventricles, but it is sometimes external to the brain.

*Treatment.*—Aspiration and continuous drainage are alike disappointing in their results.

## MENINGOCELE AND ENCEPHALOCELE

Are congenital conditions of the head, analogous to spina bifida. They are usually fatal. For pathology, treatment, &c., see p. 179.

## MICROCEPHALY WITH IDIOCY,

Due to premature ossification of the cranial sutures, has in some cases been benefited by removal of strips of bone from the vertex of the skull (craniectomy).





# INJURIES AND DISEASES OF THE SPINE.

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## INJURIES OF THE SPINE.

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THE spinal column is liable to sprains, wounds, fractures, and dislocations, and the spinal cord to disturbances similar to those which implicate the brain when injured. Much of what has been said as regards injuries of the head and their complications may be applied here, with such emendations as the difference in the structure of the parts suggests. There is one sequela that requires special mention as it is of frequent occurrence, and is often a subject of litigation—it is *traumatic neurasthenia*. It follows accidents likely to cause concussions and contusions of the spinal cord. The symptoms, which may not appear for a considerable time after the injury, are those of great nervous exhaustion; there is a diminution of mental and physical energy, resulting in lassitude; affections of the special senses with motor and vaso-motor disturbances. The *treatment* for this, as for all spinal affections, is complete rest, followed by remedies likely to improve the tone of the system.

### FRACTURES AND DISLOCATIONS OF SPINE.

Dislocation without fracture is rare, except in the cervical region. The most usual is the atlas from the axis, with or without fracture of the odontoid process. Fracture without dislocation is also rare, except as the result of direct violence—viz., a blow or a bullet wound.

Fracture-dislocation, the common form of injury, is usually caused by accidents that forcibly bend the body backwards

or forwards. When it is due to a force applied to the head and forcing the chin down on the sternum, the cervical vertebrae suffer. The usual displacement is the upper segment forwards. The injury to the cord may vary from a slight bruising to complete division. It is usually irreparable and in proportion to the displacement of the bones; but you may have lesions of it without any displacement, due to concussion, hæmorrhage and myelitis.

*Symptoms.*—The damage to the bones is indicated by deformity, crepitus, loss of power, pain and tenderness, and effusion of blood at seat of injury; the damage to the cord by functional disturbances in parts below the seat of injury. Taking the breathing as indicating injury: it ceases altogether when the cord is divided above the origin of the phrenic nerves—*i.e.*, at any point above the 5th cervical vertebra: it is purely diaphragmatic when the lower cervical vertebrae are engaged: it is normal when the injury is in the lower dorsal or lumbar region. Reflexes are as a rule temporarily lost below the point of division owing to concussion of the cord; they as a rule return for a time and are then permanently lost in consequence of a descending myelitis.

*Prognosis.*—The higher the injury and the greater the involvement of the cord, the less the chance of recovery.

*Treatment.*—Rest on back on a water bed; attention to bladder with catheter, and to bowels with enemata; dryness and cleanliness and every other precaution against bed-sores. Little else can be done in most cases, as it is the exception when the cord does not receive irreparable injury at the outset; and where the trouble is due to bone pressure, it is the backward pressure of the anterior wall—an almost impossible locality to deal with successfully—that requires correction. Where the pressure is due to hæmorrhage laminectomy is indicated. In some cases of dislocation forcible reduction has been successfully carried out: and extension and Sayre's jacket have done good in others.





## DISEASES OF SPINE.

## SPINA BIFIDA.

A cyst-like protrusion of the contents of the spinal canal through a congenital opening due to the non-union of some of the neural arches. One half the cases are met with in the lumbo-sacral region. Three forms are described—1. Spinal meningocele—a protrusion of membranes and fluid. 2. Meningo-myelocele, the most common—a protrusion of cord, membranes, and fluid. 3. Syringo-myelocele—a sac formed by the dilatation of the central canal of the spinal cord.

*Symptoms.*—There is a painless tumour springing from posterior wall of the spinal canal, of any size from a wall-nut to a cocoa-nut. It is sometimes altogether covered with skin, but as a rule on the more prominent parts the skin is replaced by a glistening semi-translucent membrane. The effects of pressure and position indicate that the sac is in connection with the sub-arachnoid space.

*Prognosis* always bad, especially when the tumour is large and anything more than a meningocele.

*Treatment* should, as a rule, be limited to the application of a soft leather support. If interference seems necessary, tapping, drainage, excision or injections may be tried. Of injections iodo-glycerine solution—iodine, gr. x.; iodide of potassium, gr. xxx.; glycerine, ʒi.—is the most approved. One to two drachms is injected once a week or so, till consolidation is complete.

## TUBERCULOUS DISEASE OF SPINE.

This disease, which is also spoken of as angular curvature, caries, Potts' disease, usually begins in the bodies of the vertebræ—the dorsal vertebræ for choice. It is a tuberculous osteitis, similar to

that which occurs in other cancellous bones. Its progress and termination are the same, except that the process known as dry caries is, perhaps, more frequent in the spine than elsewhere. When by this process, or by suppuration, or by necrotic caries, a part or the whole of the bodies of one or more vertebræ and intervertebral discs have been destroyed, an approximation of the parts above and below the diseased area takes place, necessarily accompanied by a posterior prominence, unscientifically but expressively termed an "angular curvature." This approximation also entails an anterior flexion of the spinal column, which, as it forms, is gradually corrected by a compensatory curve. Thus, with a dorsal angular curvature, you will nearly always find a lumbo-dorsal lordosis. In estimating the changes due to disease in the spinal column, its natural curves should be borne in mind. In the neck or loins a straightness may represent a deformity, which in the dorsal region would express itself by a prominence.

*Symptoms.*—1. Pain (*a*) at seat of disease, increased on movement, say, on jumping from a chair; (*b*) in regions supplied by nerves from neighbourhood of affected area. 2. Rigidity of the spine, apparent when the child looks round, tries to bend, &c. 3. "Spinal postures." Such postures as tend to relieve the spine of the weight it has to carry. 4. Deformity—*i.e.*, angular curvature. 5. Abscess—retro-pharyngeal, dorsal, psoas, lumbar. 6. Paralysis, nearly always motor, and the result of a protective inflammatory thickening external to the dura, and not, except in rare instances, due to pressure of displaced vertebræ. When the disease exists between the atlas and axis, or between the atlas and occipital bone, the former being of the two the more common situation, the chief symptoms are pain and rigidity locally—the patient supporting his head and fearing to turn it, and pain extending down the neck, shoulders, and upper extremities, and upwards over the integument of the scalp. Dislocation, gradual or sudden, with compression of the cord, may occur during the progress of the disease in this locality.





*Treatment.*—1. Rest in the recumbent position, with extension, and in cervical cases the support of sand bags. 2. Jacket of plaster-of-Paris, silicate of potash, poroplastic felt, or leather, to which a jury mast or other support for head is added when the disease is above mid-dorsal region. 3. The constitutional treatment usual in tuberculous diseases.

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## ABSCESSES DUE TO CARIES OF THE SPINE.

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### RETRO-PHARYNGEAL ABSCESS.

Due to caries of upper cervical vertebræ. It may be seen or felt bulging at the back of the pharynx, and it may open there or at either border of the sterno-mastoid.

*Treatment.*—It should be opened early as there is danger of sepsis and suffocation should it burst into the pharynx. The best incision is an external one behind the sterno-mastoid, as thereby asepsis can be secured.

### DORSAL ABSCESS.

In caries of the dorsal vertebræ the fluid collects in the posterior mediastinum and then passes, not unfrequently, between the transverse processes to the back where it should be opened by aseptic incision and drained.

### PSOAS ABSCESS.

Sometimes pus that collects in the posterior mediastinum does not burrow backwards, but passes downwards under the ligamentum arcuatum internum and enters the sheath of the psoas muscle. Pus enters the same muscle in a more direct fashion when the vertebræ from which it springs are affected. The abscess descends in the sheath of the muscle to the iliac fossa, where it forms a large swelling limited by the attachment of the ilco psoas fascia to the brim of the pelvis and the

crest of the ilium. If it goes further it passes under Poupart's ligament external to the artery, and following the profunda, collects under the adductor longus and the gracilis. In subsequent wanderings it is guided by the vessels.

*Diagnosis.*—In psoas abscess there is inability to fully straighten the thigh without lordosis, and the sheath of the muscle can be felt distended. When the abscess descends below Poupart's ligament it resembles a hernia, for there is impulse on coughing, and it disappears when the patient lies down, but the manner in which it disappears is not that of a hernia, and its position is external to the vessels. Psoas abscesses due to spinal caries may be distinguished from collections of pus from other sources finding their way into the muscle, or pointing independently in the groin, such as perinephritic, pericæcal, glandular, iliac abscesses, and empyemas, by looking for symptoms indicating the source of the suppuration.

*Treatment.*—Aseptic incision in the loin, or groin, or both. In the loin, by a vertical incision at the outer edge of the erector spinæ, divide the external and internal oblique and transversalis muscles and the lumbar fasciæ, exposing the edge of the quadratus lumborum. Then, by a transverse incision, divide some fibres of that muscle and the transversalis fasciæ on a level with the second or third lumbar vertebræ, and make room for your finger to feel out and open up the distended sheath of the psoas. If the abscess has been already opened lower down the passage of a long probe will afford a point on which to cut and make the incision for posterior drainage easy. Even if the abscess has burst low down it is well to tap and drain it at as high a point as possible.

*Lumbar abscess.*—In lumbar caries the matter may, as in dorsal caries, pass backwards and open in the loin, *lumbar abscess*.

*Treatment.*—Aseptic incision and drainage.





## LATERAL CURVATURE OF SPINE.

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Lateral curvature is a condition met with usually in girls between the ages of twelve and eighteen.

The following terms are in use to describe curvatures :—*Scoliosis*, lateral curvature. *Lordosis*, forward curvature. *Kyphosis*, backward curvature.

*Causes*.—1. Muscular fatigue resulting in one-sided positions of case at a time of life when the osseous and ligamentous structures of the spine are not fully developed. 2. Occupations causing unequal muscular development, and faulty positions such as sitting crooked at a desk. 3. Obliquity of the pelvis from unequal length of the lower limbs or other cause. 4. Contractions following on empyema. A curve once started if left to itself tends to increase, as does a bulge in a new wall with a heavy coping.

*The Changes in the Spine*.—There are always two curves—a primary and a secondary or compensatory. The most common form is a curve in the upper dorsal region, with the convexity to the right side, and a compensatory lumbar curve with its convexity the other way. Together with the curve there is a rotation of the involved vertebræ, in such fashion that their spinous processes point towards the concavity of the curve. In very marked cases the spinous processes mark the inner border of the curve and the bodies the outer. The ribs necessarily share in this rotatory movement and curvature. Those on the convex side are carried backwards, their angles are prominent, making the scapula project; they are widely separated, and more horizontal than normal. The reverse is the case on the concave side. There the ribs are crowded together and thrown forward, making the left breast prominent. As regards the lower or compensatory curve, its effects are chiefly expressed in the pelvis. In ordinary cases the right scapula and the left hip are said to be “growing out.”

*Symptoms.*—These lie in the already mentioned changes in the position of spine and ribs.

*Treatment.*—Regulated exercises (Ling's or Roth's system), stopping short of fatigue, should be methodically carried out, combined with massage and periods of rest in the recumbent position. Faulty habits and postures should be corrected. The general health should be looked to. The patient should have a flat mattress and a reclining chair with a flat back. Spinal jackets and supports are on no account to be prescribed, except in very advanced cases.

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## INJURIES AND DISEASES OF THE CHEEKS, LIPS, MOUTH, GUMS, JAWS, TONGUE, UVULA, PALATE, FAUCES, AND TONSILS.

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### RODENT ULCER

Usually occurs on the face, but it may occur anywhere; the side of the nose or cheek below the inner angle of the eye is a favourite site. It is a superficial epithelioma. It begins as a brown tubercle and spreads slowly, by continuity of tissue, sometimes healing in parts with an abnormal scar that does not contract. It is irregular in shape. Its edges are raised, often warty. Its surface is without granulations, and has been likened to a layer of pink wax. Scabs may form and drop off. Its course is progressive, but it is only locally malignant. *Diagnosis.*—It is distinguished from epithelioma by absence of glandular affection; from syphilis by its slow progress; from lupus by its singleness and the age of the patient. *Treatment.*—1. Complete excision. 2. Cauterisation with chloride of zinc paste. 3. Scraping with a Volkmann scoop, followed by a rubbing in of chlorate of potash.

### SALIVARY FISTULA.

May be the result of injury or disease. The saliva trickles outwards on to the cheek. *Treatment.*—Make free the natural channel and then close external opening by a plastic operation.

### EPITHELIOMA OF THE LIP

Occurs on the lower lip of old men who smoke. It begins as a fissure or tubercle, and may spread either superficially or deeply.

The glands of the neck may be involved, but it is seldom disseminated further. *Diagnosis* from hard chancre is made by the age and history of patient and the rapid growth of the syphilitic affection. *Treatment*.—Free excision, if done early, gives satisfactory results.

#### HARE-LIP AND CLEFT PALATE.

**Congenital deformities.** In a young superior maxillary bone a line of union marks off a small segment of the palate, including the two incisor teeth. In some animals this remains permanently as a separate piece constituting the intermaxillary bone. In cleft palate of the human subject the line in question is represented by a cleft, sometimes small, sometimes extending through hard and soft palate from pharynx to face. If the cleft is on both sides the premaxillary bones form an ill-developed projecting central mass.

#### HARE-LIP

Is often associated with cleft palate, but may exist independently. It is a corresponding deformity of the soft parts, due to a non-union of the median portion of the lip with one or both lateral portions. It may be single or double. Single on the left side is the common form. The fissure may be a mere notch, or may extend into the nostril above. *Treatment* consists in paring the edges of the cleft, and bringing the raw surfaces into contact by means of hare-lip pins and sutures. The lip should be operated on at about three months, the palate at about three years old.

#### STOMATITIS,

Or inflammation of the mouth, may be *aphthous*, *parasitic*, *ulcerative*, *syphilitic* or *mercurial*. It should be treated by attention to the digestive organs, antiseptic washes, good hygiene, and correction of any constitutional ailment.

#### CANCERUM ORIS,

Or gangrenous stomatitis.—A phagedænic slough forms in the mouth of an ill-cared-for child recovering from some zymotic









disease. This often spreads rapidly, engages the whole thickness of the cheeks, and ends in general septicæmia. Under like conditions a like ulceration attacks the genitals of female children. It is styled noma. *Treatment*.—Improve and support the condition of child; apply nitric acid or boro-glycerine locally.

#### RANULA

Is a globular swelling under the tongue, due to the collection of a glairy fluid in one of the mucous follicles. *Treatment*.—Snip off a portion of the cyst wall with a pair of scissors.

#### GUM-BOIL.

Abscess due to caries of teeth. It may form at the edge of the alveolus, or at the point of a fang. From the latter place the pus may burrow through the bone and point, in the case of the lower jaw near the angle, in the case of the upper in the roof of the mouth or the antrum. In either case it sets up much inflammation and swelling. *Treatment*.—Extract the offending tooth and open the abscess early.

#### EPULIS—

Fibrous and Malignant. Fibrous epulis is a pedunculated tumour that springs from the periosteum of the alveolus. *Treatment*.—Excision together with the alveolar border from which it springs.

#### MALIGNANT EPULIS—

Myeloid Sarcoma. It is a more vascular and rapidly growing tumour than the above. It should be early and thoroughly removed.

#### NECROSIS OF THE JAW

May be due to caries of teeth, to poisoning by mercury, or by the fumes of sulphur, or to any of the causes that produce necrosis elsewhere. *Treatment*.—Nothing special.

#### ABSCESS OF THE ANTRUM.

Due usually to suppuration extending from the fang of a tooth. There is deep-seated pain and throbbing locally, and often in the

frontal sinus as well. Pus may escape into the nose, or through the socket of a tooth. *Treatment*.—Extract any carious tooth in the neighbourhood and perforate and drain the antrum, either through its socket or over the alveolus.

### TUMOURS AND CYSTS

Of various kinds form in connection with the antrum and other parts of the upper jaw. Those that begin in the antrum will, as they grow, cause a bulging of the cheek and the palate, looseness of some teeth, obstruction of one nostril and lachrymal duct, protrusion of the eye-ball, and sometimes difficulty of breathing and swallowing.

*Diagnosis*.—1st. The solid tumours have to be distinguished from fluid accumulation, and if there is doubt this is best done by exploratory puncture.

2nd. The primary seat of the tumour has to be defined, at least as far as those springing from behind the superior maxilla are concerned; for they, when malignant, are not operable. These latter shove forward the bone bodily, and do not present the symptoms of encroachment just referred to in connection with tumours of the antrum.

3rd. The malignancy or non-malignancy of the growths has to be considered. All that has been said on this point in the chapter on Tumours holds good.

*Treatment*.—Extirpation together with the whole of the superior maxilla when necessary. The tumours that are not operable are many. They are those that are malignant, and that cannot be removed *in toto*.

### TUMOURS OF THE LOWER JAW

Are of frequent occurrence, especially osteomata and sarcomata. What has been said of similar growths elsewhere applies here.

### TONGUE-TIE

Is due to a shortness of the frænum. It should be notched with blunt-point scissors directed downwards and backwards.





## MACRO-GLOSSIA

Is a congenital or early-acquired enlargement of the tongue.

*Treatment.*—Partial excision.

## GLOSSITIS

May be acute or chronic. In the former cases the tongue is often much enlarged, interfering with deglutition and respiration. Any irritant may be the cause. *Treatment.*—Free longitudinal incisions along the dorsum.

## IN CHRONIC GLOSSITIS

The epithelium may get heaped up in colourless patches and streaks, giving appearances known as psoriasis, ichthyosis, and leucoplakia.

*Treatment.*—Apply boro-glycerine, mel-boracis, or chlorate of potash locally. Forbid smoking, and where indicated treat for syphilis.

## ULCERATION OF TONGUE

May be simple—*i.e.*, due to dyspepsia or a sharp tooth—aphthous, lupoid, or tubercular. The treatment in each case will suggest itself.

*Syphilis* may cause in the tongue *mucous tubercles, white patches and streaks; superficial ulcers* with grey surface and irregular sharp-cut edges; *fissures* with thickened epithelium, and *deep ulcers* due to the breaking down of gummata.

## EPITHELIOMA OF TONGUE

Soon breaks into ulceration. It occurs often where a tooth has irritated or a syphilitic scar has remained. The side of the tongue opposite the molar teeth is its favourite site. It has the characters and runs the course of ulcerating epithelioma elsewhere. It has to be distinguished from simple ulcer due to the irritation of a tooth, and from an ulcerating gumma. In epithelioma there is infiltration of neighbouring structures, and the induration

begins superficially and spreads inwards; while in syphilis the reverse is the case. However, many cases are doubtful, and in such a small piece of tissue should be removed for microscopic examination. *Treatment*.—Early and complete removal of all diseased parts.

#### ELONGATED UVULA

May arise from catarrh or chronic infiltration, and cause a tickling cough. When it is troublesome a portion of it may be snipped off.

#### NECROSIS AND PERFORATION

Of the hard palate often result from syphilis. An obturator should be fitted, as plastic operations to close such opening are seldom successful.

#### ACUTE TONSILLITIS (QUINSY)

Does not, as a rule, attack both tonsils simultaneously.

*Symptoms*.—Those of local and general inflammation. Temp.  $104^{\circ}$ - $105^{\circ}$  F. The patient is seen with saliva dribbling from his open mouth; talking with difficulty; and suffering great pain. shooting into the ear whenever he attempts to swallow the viscid mucus that collects in his pharynx. When suppuration, which is usually peritonsillar, occurs, the swelling extends forward, towards soft palate, where the spot at which it is about to point may be detected by the finger earlier than in any other way. *Causes*.—Not clear. Some people have a special liability, which disappears with time. It sometimes precedes an attack of acute rheumatism. *Treatment*.—A purgative, antipyrene, steam inhalation, and spray of cocaine and carbolic acid at intervals. During the period of anaesthesia resulting from the latter, let the patient take nourishment. When pus forms, it should be evacuated early, by an incision inwards with a bistoury, guarded by a wrapping of plaster to within an inch of its point.





## CHRONIC ENLARGEMENT OF THE TONSILS.

Common in strumous children, is of two kinds. In the hard variety the connective tissue of the tonsil is increased. In the soft variety there is a swelling of the minute lymph-glands, which are the essential feature of the tonsil. The importance of this lymphadenoid tissue, since it is in direct communication with the lymph-channels in the neighbourhood, cannot be over-estimated. For instance, by absorption through them of bacilli, enlargement of the glands of the neck may be produced. Associated with this kind of enlargement there are often adenoid growths on the pharyngeal and post-nasal mucous membranes. Furthermore, tonsils, if much enlarged, impair the general health, by mechanically interfering with respiration. *Treatment*.—Excision by means of guillotine, or astringent applications.

SIMPLE. TUBERCULAR, SYPHILITIC, AND MALIGNANT  
ULCERATIONS

May occur on the tonsils, palate, and fauces under the same conditions that they occur on the tongue.

## DISEASES OF THE NOSE AND NASO-PHARYNX.

## EPISTAXIS

May be due to—1, injury; 2, congestion; 3, ulceration; 4, new growths; 5, vicarious menstruation. It may simulate hæmatemesis or hæmoptysis when the blood trickles backwards. Sometimes the bleeding point is visible on anterior and lower part of septum. *Treatment*.—Epistaxis, the result of congestion, should not be heedlessly interfered with. Apply styptics to bleeding point if visible; use cocaine spray; or put the patient sitting upright with warmth to the feet, cold to the head, and an elastic band to the upper lip. If it still continues, plug the anterior and posterior nares. For this purpose Bellocq's sound, or an inflatable tampon is useful.

## OZENA.

A chronic foetid, muco-purulent discharge from the nose, sometimes due to simple ulceration, oftener to syphilitic or tuberculous ulceration of the mucous membrane or bones. *Treatment*.—Antiseptic and astringent applications by means of nasal douche and brush, and suitable constitutional remedies.

## HYPERTROPHIC RHINITIS.

The mucous membrane of the nose, especially that over the middle and lower turbinals, is liable to become hypertrophied from chronic inflammation. There is a feeling of obstruction; and a thickening of the membrane which, except that it is not sessile and movable, is not unlike a polypus. *Treatment*.—Emollient and astringent applications, and, in severe cases, linear scarification with the galvano-cautery, or removal of the inferior turbinal.

## POLYPI.

1st. Mucous; 2nd. Fibrous; 3rd. Malignant.

1st.—*Mucous or Gelatinous Polypi* usually spring from the edge or under surface of the middle turbinal, seldom, if ever, from the septum. They are usually multiple and of all sizes. The symptoms are those of nasal obstruction.

*Treatment*.—Removal by means of forceps, or by the cold or the galvano-cautery snare.

2nd.—*Fibrous Polypi* are fibromata springing as a rule from the basilar process or from the sphenoid. They are usually single, may grow to a large size, bleed freely, and press on all neighbouring parts.

*Treatment*.—Early removal by galvano-cautery or other means.

3rd.—*Malignant Polypi* are sarcomata and carcinomata developing in the nasal cavity. They present the usual signs of malignancy, and are very intractable.





## THE SEPTUM NAÏ

Is liable to deflections. It may be forcibly straightened by forceps, and kept in its place by plugs. It is also liable to perforating syphilitic ulcerations, and to be the seat of tumours, abscesses, and other affections.

## ADENOID VEGETATIONS

Of the naso-pharynx.—The vault of the pharynx is rich in lymphoid tissue, two lateral masses of which near the orifices of the Eustachean tubes are styled pharyngeal tonsils. In young lymphatic subjects there is often a general overgrowth of this tissue, so that in bad cases it hangs down in tongue-shaped vegetations. The enlargement, which is often associated with hypertrophied tonsils, tends to block the Eustachean tubes and the nose, causing deafness, nasal intonation, and faulty respiration. The condition is worse in damp weather. The nose is generally narrow, and fluids injected up one nostril do not return easily by the other.

*Treatment.*—The growths should be removed by means of the finger-nail, curette, or forceps.

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# INJURIES AND DISEASES OF THE NECK.

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## INJURIES OF ŒSOPHAGUS.

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### FOREIGN BODIES

In the œsophagus usually lodge just behind the cricoid cartilage, but they may do so at any point.†

*Symptoms.*—Pain, and ineffectual attempts to swallow the offending body.

*Treatment.*—See if it can be reached with finger. This failing, try pharyngeal forceps, coin-catcher, horse-hair extractor, or sponge-probang, according as one or other is indicated. All other measures failing, œsophagotomy must be had recourse to, especially when the body is sharp or rough; for there is danger of the œsophagus being perforated or ulcerating through, and a septic inflammation starting in the tissues outside.

Should a sharp or jagged body find its way into the stomach, rest and pultaceous food should be enjoined for some days. Bodies may be removed both from the œsophagus and stomach by gastrotomy—a very successful operation as a rule.

### SCALDS

Of the œsophagus in children, from putting the mouth to a boiling kettle; and charring, from swallowing corrosive chemicals, are not infrequent occurrences. When not fatal they often give rise to stricture.

*Treatment.*—The patient should be fed by enemata, and the parts let rest.









## INJURIES OF THE AIR PASSAGES.

*Scalds and stings of insects* often cause œdematous laryngitis, and may necessitate tracheotomy.

## FOREIGN BODIES

Are drawn into the air passages during inhalation. They may lodge in the larynx, the trachea, or one of the bronchi—the right bronchus usually, for it is in more direct line with the trachea, and the septum of the trachea is to the left.

*Symptoms.*—Spasmodic coughing, a sense of suffocation, often vomiting. The symptoms are most acute when the body is in the larynx, and the spasm it then excites may cause death, even when the body is small. After a time the symptoms tend to subside, but they are again excited by any movement of the intruding substance. The laryngoscope and stethoscope often give useful information. If the foreign body is allowed to remain it will excite inflammation.

*Treatment.*—If called to a recent case in which there are symptoms of asphyxia, see what you can do with your fingers in the neighbourhood of the glottis; and failing to give relief, perform laryngotomy at once. When the symptoms are not urgent, the body (if it is in one of the ventricles of the larynx) may be removed with the aid of a laryngoscope and a forceps, or by thyrotomy. If it is lower down it will be well to perform a free tracheotomy and to keep the wound open with hooks. Inversion may then be tried, and, if without result, the patient should be let rest for two days. Should it not during this time be coughed into or through the wound it should be searched for with forceps or whatever appliance seems most likely to be helpful in dislodging it.

## WOUNDS OF THE THROAT

Are usually suicidal or homicidal in their origin. They may implicate any of the vessels and nerves of the neck, the floor of the mouth, air passages, the œsophagus, and the spinal cord. The

immediate dangers (given the extent of the injury) are evident. The remote dangers lie in œdematous laryngitis, cellulitis, broncho-pneumonia, and in cicatricial contraction subsequent to healing.

*Treatment.*—Treat the wound, as far as muscles, vessels, and nerves are concerned, in the usual way. The air passages should be cleared of blood, and wounds in them and the œsophagus brought together by suture; provided, as regards the former, that doing so does not interfere with respiration. As regards the wound generally, it may be closed and drained, although in the pre-aseptic age it was the rule to leave it open. In some cases it may be necessary to perform tracheotomy, in others to pass a tube into the trachea through an already existing wound, and to plug round it to exclude blood. In the case of deep transverse wounds the head should be fixed forward. Some cases must be fed by a tube—a gum-elastic catheter, for instance, passed into the œsophagus through the mouth.

## DISEASES OF ŒSOPHAGUS.

### DIVERTICULA.

These are usually situated rather in the pharynx than the œsophagus, mostly behind; and are due to a protrusion of the mucous membrane through the muscular coat. Such pouches are rare. They cause trouble by pressure when distended with food. They can be removed by operation.

### STRICTURE

Of the œsophagus may be (1) spasmodic, (2) fibrous, (3) cancerous. Dysphagia is the chief symptom common to all; but this trouble may be dependent on other causes, such as foreign bodies lodged in œsophagus, the pressure of tumours, abscesses, aneurysms of innominate or aorta, &c.

1. *Spasmodic*, usually hysterical, situated high up, and started by some injury or slight local inflammation.





2. *Fibrous*.—Scar tissue, produced often by corrosive fluids.

3. *Cancerous*.—It usually occurs at points naturally narrow—*i.e.*, at either end or opposite the bifurcation of the trachea. It is squamous, except at the lower end, where it is usually glandular.

*Diagnosis*.—Inquire whether the degree of dysphagia present has come on slowly. Examine for extra-œsophageal causes of dysphagia. If none found, pass a bougie, which would be a most dangerous proceeding were an aneurysm the cause. To do so put the patient sitting, his head inclined *forwards*; then, standing in front, guide the bougie, softened and smeared with glyeerine, into the back of the throat with the forefinger. The bougie indicates the seat and degree of stricture. It may also indicate malignancy, if the stricture is found to be rough and to bleed easily. The other points that help diagnosis are the rapidity of growth; the age of the patient; and his history, especially as regards injury or syphilitic ulceration likely to cause the formation of cicatricial tissue.

*Treatment*.—In fibrous stricture, gradual or forcible dilatation; internal œsophagotomy; insertion of a Symond's tube; retrograde dilatation from the stomach; or gastrostomy. In cancerous stricture, a Symond's tube and gastrostomy are the only help, as any stretching of the walls of the œsophagus might lead to rupture.

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## DISEASES OF LARYNX.

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### LARYNGITIS

May be simple, tubercular, syphilitic, or diphtheritic. *Simple* laryngitis may be due to cold, to overstraining the organ in speaking, to the extension of inflammation from neighbouring parts, or it may be traumatic in its origin. The inflammation may be confined to the mucous membrane—"catarrhal;" or it may extend to the areolar tissue—"œdematous." This latter kind is occasionally "erysipelatous." "Clergyman's sore-throat" is the

familiar name of simple chronic laryngitis. The symptoms vary with the degree and kind of inflammation. In the œdematous form there are spasms of dyspnœa, loss of voice, and in bad cases signs of suffocation. In the catarrhal form, when acute, we have stridulous voice and breathing, local pain, some dyspnœa, and frothy sanguineous expectoration. In clergyman's sore-throat there is hoarseness or loss of voice and a tickling cough. The laryngoscope will reveal the affected parts œdematous, intensely injected, or in a state of chronic congestion, as the case may be.

*Treatment* should in acute cases be antiphlogistic, with inhalations of steam (plain or medicated), fomentations, and, if there is danger of suffocation, tracheotomy. In the chronic form, rest for the voice, change to dry bracing air, and astringent applications locally.

#### TUBERCULAR LARYNGITIS,

Or laryngeal phthisis, is usually associated with pulmonary phthisis. Pyriform enlargement of the aryteno-epiglottidean folds in a phthisical subject is indicative of the disease. Little, if anything, can be done for it locally.

#### SYPHILITIC LARYNGITIS

Is usually met with in the tertiary stage. The connective tissue growth characteristic of syphilis takes place and goes on to ulceration. Stenosis of the glottis often results. The treatment is that of constitutional syphilis.

#### DIPHTHERITIC LARYNGITIS

Is a disease due to invasion by a specific bacillus, and attended with the formation of a false membrane in the larynx and pharynx. It usually prevails in an epidemic form and attacks the young—its spread being favoured by insanitary surroundings. *Diagnosis*.—When the disease begins in the pharynx the false membrane is evidence of the condition. When it spreads to the larynx, or begins there, stridulous voice and breathing and





dyspnœa are very marked. There is, moreover, febrile disturbance, and the glands at the angle of the jaw are enlarged. The patient may die from asphyxia, or from the effects of the poison of the disease on the system. *Treatment*.—Injection of diphtheria anti-toxin, spray of perchloride of mercury locally; tracheotomy or intubation of larynx when the dyspnœa is accompanied by retrocession of the lower chest wall.

*Malignant Disease*.—The most frequent form is epithelioma in men between forty-five and sixty-five. It has to be diagnosed from simple growths in its early stages, and syphilitic in its later. The usual means of distinguishing these diseases have to be employed here. *Treatment*.—In early cases the question of the advisability of thyrotomy and excision of larynx, and in late cases the question of tracheotomy will arise.

#### GOÏTRE.

Bronchocoele, or goître, is a non-inflammatory enlargement of the thyroid gland. The enlargement may be general, or of a particular part, and it may be of the nature of a simple hypertrophy, or of one in which fibrous or cystic characters predominate.

Its cause is not known. It is very rife in some valleys of Switzerland and in Derbyshire. It is recognised by its shape, position, and by its moving with the larynx when the patient swallows. It causes trouble by its size, and by pressure on neighbouring parts, especially the trachea.

*Treatment*.—Good hygienic conditions; iodide of potassium internally; iodine locally. Treat anæmia, if present. When operation is necessary, owing to pressure symptoms, remove a portion of the gland or divide the isthmus.

#### WRY NECK.

*Wry Neck*, or *Torticollis*. *Causes*.—Contraction of sterno-mastoid; disease of cervical vertebræ; hysteria. In distinguishing between these conditions, an anæsthetic will be helpful. *Treatment*.—When the sterno-mastoid is permanently contracted, divide it by a *open* incision half an inch above the clavicle.

# INJURIES AND DISEASES OF THE EAR.

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## AFFECTIONS OF EXTERNAL EAR AND MEATUS.

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### IMPACTED CERUMEN AND FOREIGN BODIES.

THE condition in either case is obvious on using the speculum and the aural syringe is the best instrument for its cure. Some foreign bodies defy the most ingenious devices, and, if they excite inflammation, may call for detachment of the auricle posteriorly, and a chiselling of the bony canal.

### EXOSTOSES

Sometimes so close the canal as to interfere with hearing, and to require removal with a drill.

### AFFECTIONS OF THE MIDDLE EAR.

In considering these affections it must be borne in mind that the lining membrane of the middle ear is continuous with that of the naso-pharynx, and that when the membrana tympani is sound, the Eustachian tube is the only channel by which inflammatory and other secretions can drain away.

### ACUTE INFLAMMATION

Is caused by cold; sea-bathing; and by extension of inflammation from the naso-pharynx, as in scarlatina. *Symptoms.*—Pain and throbbing in the ear, deafness, and fever. The canal is swollen,





the membrane red, and perhaps bulging, the Eustachian tube is close by inflammatory swelling. *Treatment*.—Purgatives; leeches in front of the tragus; hot fomentations; and, where there is any bulging of the membrana tympani, an incision behind the handle of the malleus.

#### SUB-ACUTE INFLAMMATION

Is a mild form of the above, and chronic inflammation is a sequela of either. In this latter affection all structures are thickened and inelastic. The membrane is usually seen retracted and lustreless, and the handle of the malleus unduly prominent. *Treatment*.—Alkaline douches to the naso-pharynx, and inflation of the middle ear through the Eustachian tube.

#### OTORRHŒA

Is a symptom of chronic suppuration within the tympanic cavity, the result of which may have been started by acute inflammation, or tubercular disease. It is often associated with caries and necrosis of the walls of the canal, and with polypi and large granulations. Over and above its effect on hearing, and the dangers attending all prolonged suppurations, it is important, because it may give rise to the intra-cranial complications mentioned at p. 174.

*Symptoms*.—On clearing the external meatus of pus a perforation in the membrana tympani can be detected, and on inflating the tympanic cavity pus can be seen and heard flowing through the opening. *Treatment*.—Keep the parts aseptic by syringing with some warm, mild antiseptic, and the opening of the Eustachian tube into the naso-pharynx free by alkaline douches. Apply boric acid, either dissolved in spirit, or in powder, and improve the general health. In persistent cases the mastoid cells, if engaged, must be opened up. Polypi, when present, must be made aseptic, and removed with snare or forceps. It is easy to light up far-reaching septic trouble by ill-judged interference with quiescent cases.

## AFFECTIONS OF THE INTERNAL EAR.

Deafness may arise from diseases of the auditory and receptive apparatus, for which little can be done, and which belong to the domain of general medicine. The same may be said of tinnitus aurium, except when it depends on some faulty condition of the external meatus or middle ear.

## MENIERE'S DISEASE

Is the name given to sudden giddiness and tinnitus, with nausea and faintness, due to a hæmorrhage into the labyrinth. Little can be done for it.





# INJURIES AND DISEASES OF THE CHEST.

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## FRACTURE OF RIBS.

THE ribs most likely to be broken are those from the 4th to the 8th, because they are, at the same time, fixed and exposed. Under indirect violence a rib usually gives way at or about its angle. When the violence is direct there is special danger of underlying parts being wounded by a fragment. *Symptoms.*—A catching pain at seat of injury on full inspiration, or on compression of chest; breathing shallow and diaphragmatic; injured rib irregular in outline; crepitus felt or heard on movement.

*Treatment.*—The injured side is strapped from above downwards during expiration, with 2-inch strips going fully from spine to sternum, and overlapping one another by half their width. Period of union three weeks.

## CONTUSION OF THE LUNG

May occur without a penetrating wound or fracture of ribs. There is paroxysmal dyspnoea, and after a time the patient coughs up some semi-coagulated blood that was extravasated at the time of injury.

## WOUNDS OF THE LUNG,

Are usually caused by a broken rib, a stab or a bullet. They are divided into those with and without a wound communicating externally with the air.

*Symptoms.*—Dyspnœa with cough and expectoration of bloody mucus and râles on auscultation. Hæmorrhage may be fatal either through loss of blood or by suffocation. It may be external, or into the pleural cavity (*hæmothorax*), or the blood may be coughed up (*hæmoptysis*). The air also leaves its usual channels, and escapes either externally through wound or into the pleural cavity (*pneumothorax*), or into the cellular tissue (*emphysema*).

*Treatment.*—When the lung is wounded by a broken rib without an external wound, strap the injured side from spine to sternum, unless doing so markedly increases pain and dyspnœa. Should blood or serum accumulate in the pleura, it will seldom decompose, as the air that reaches it is filtered from organisms in its passage through the lung. When there is an open clean cut wound, not very deep, it should be closed, the external wound and skin having been thoroughly cleansed. Syringing of the deeper parts is not advisable. Large and deep wounds, as a rule, require drainage, and should, therefore, not be completely closed except with a view to stop excessive hæmorrhage. When the lodgment of a bullet or foreign body is suspected it should, of course, be searched for with the aseptic finger or probe at the primary examination. *Hæmorrhage* is checked by keeping patient at complete rest and lying on the injured side, which may be strapped. Injections of ergotin and the swallowing of small bits of ice are also useful. If the blood is flowing externally to an alarming degree, the closure of the wound is indicated, so as to cause the blood to accumulate in the pleura and compress the lung.

HÆMOTHORAX, PNEUMOTHORAX, HYDROTHORAX, AND EMPYEMA Result from injury of the lung and other causes. Auscultation and percussion, in conjunction with the history of the case, and the use of the aspirator when there is doubt, are the means of diagnosis.

*Treatment.*—Hæmothorax should be treated—1st, by checking the hæmorrhage to which it is due (it may be from an





artery, intercostal or mammary, or from the lung). 2. By giving speedy exit to the blood, should it threaten suffocation or should it decompose. 3. If neither of these contingencies happen, the blood should be left for five or six days, and then, when there is little danger of further hæmorrhage, it should be drawn off, a little at a time, through a large aspirator-needle.

*Pneumothorax* requires no special treatment.

In *Hydrothorax* and *Empyema* the pleural cavity is usually aspirated at a point in the fifth or sixth intercostal space and in the mid-axillary line. A small incision is first made in the skin which is drawn down so as to make the wound valvular. The needle or trocar is passed along the upper border of the rib. Severe pain and the appearance of blood-stained serum are indications that more fluid should not be withdrawn. A piece of plaster is sufficient dressing for the wound. Incision and drainage of the pleura may be done at the point of selection for tapping—the easiest locality—or at a point below and external to the angle of the scapula—the best place for drainage. When the latter spot is chosen a piece of rib should, as a rule, be excised. This is easily done, for when the periosteum is reflected from the bone it takes the vessels with it. The tube should be of india-rubber, with a shield to prevent its dropping into the pleural cavity.

*Estlander's* operation is done to cause collapse of the rigid wall of the chest. The limits of the cavity to be closed are ascertained by means of a probe, and a proportionate area of the ribs and thickened pleura removed. Each rib is removed separately as when doing a resection for drainage.

*Tapping* cavities in the lung may be called for when a gangrenous cavity, or one containing a foreign body, is near the surface and can be localised. An aspirator-needle first defines the position of the cavity; then if adhesions exist a scalpel is passed into it, using the needle as a guide. The wound may be further dilated by

Hilton's method. If no adhesions exist, they must be promoted by stitching the visceral to the parietal pleura at the site of the intended operation.

#### TAPPING AND DRAINAGE OF THE PERICARDIUM

Are done at the fourth or fifth intercostal space. The former operation is best done with a small aspirator-needle, in which a vacuum is made as soon as its point is buried in the tissues, and which, therefore, when it reaches the fluid makes known the fact.

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# DISEASES OF THE BREAST.

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## ECZEMA OF THE NIPPLE

Is the name given to a chronic ulceration described by Paget. It is so intractable, and so often leads to cancer, that amputation of the breast is a judicious proceeding in connection with it.

## MASTITIS

Is usually puerperal, and often ends in suppuration. In such cases the essential "cocci" make their entrance usually through an abraded nipple. The symptoms and treatment are the same as of inflammation elsewhere. Rest is best given by leaving off suckling the child at the affected breast, and by fixing the arm to the side. Glycerine and belladonna make a good local application.

## ABSCESS OF THE BREAST

Is the result of mastitis. The pus may form in the breast—*intra*—or underneath it—*sub-mammary abscess*. It should be opened by an incision placed where it will give best drainage, and made in a line radiating from the nipple. Sub-mammary abscess is best drained by an incision at the lower and outer border of the breast.

## CHRONIC ABSCESS

Of the breast may be due either to an inflammatory suppuration becoming encapsuled, or to a tuberculosis. It often simulates scirrhus, feeling hard, with the glands enlarged, and the nipple retracted. The age of the patient and the tendency of the glands

to suppurate are diagnostic, but an exploratory incision is the proper way of clearing up the doubt. When a chronic abscess collects underneath the breast it is usually due to a carious rib.

*Treatment.*—Free incision and drainage, with removal of diseased tissues.

### CHRONIC LOBULAR INTERSTITIAL MASTITIS

Simulates scirrhus, and occurs about the same time of life. There is a sub-acute inflammation, with a subsequent contraction of the cellular tissue of the affected lobule, and consequent constriction of the acini and ducts, and the formation of minute retention cysts. The disease is sometimes diffuse.

*Diagnosis.*—The lump under consideration is not a new growth, but an indurated piece of mammary gland. It is less elastic than a cyst or chronic abscess, and not so hard as scirrhus. It does not cause retraction of the nipple.

*Treatment.*—When it is diffuse it is best left alone; when only a single lobule is affected, that lobule should be removed and examined.

### CYSTS OF THE BREAST

Are due mostly to the constriction of the acini and ducts by interstitial inflammatory constrictions and other changes. Only in rare cases, however, do we find them containing *milk* (galactoceles). Serous and hydatid cysts are also met with.

### TUMOURS OF THE BREAST.

The most common simple form is fibro-adenoma, clinically called chronic mammary tumour. It is encapsuled and sometimes combined with cysts. Other simple connective tissue tumours occur, but they are rare.

*Sarcomata* are usually met with in women under the age of thirty. Histologically they consist of all forms of sarcoma, combined with fibrous and adenomatous elements and with cysts. They resemble fibro-adenomata in their early stages, but they grow more rapidly and tend to infiltrate the neighbouring tissues.





## CANCER OF THE BREAST.

Scirrhus is the form oftenest met with. *Symptoms.*—It occurs in women between the ages of thirty-five and sixty. In young women it usually grows fast; in very old it sometimes assumes a slow atrophic form. In its early stages it does not make itself felt. After a time accident or darting pain directs the patient's attention to it, and she is surprised to find in her breast an ill-defined lump of great hardness, from which strands of tissue radiate. The skin over it is adherent, and puckers when the tumour is moved; later on it is drawn down into a dimple. Other symptoms previous to ulceration are stabbing pain, retraction of the nipples, and enlargement of axillary glands. To see if it is deeply adherent, tell the patient to stretch out her arm and make tense the pectoralis major. More advanced symptoms are ulceration, cachexia, and secondary deposits in remote organs. The cachexia is probably due to products absorbed into the system from the growth.

*Treatment.*—The removal of all diseased parts as early as possible except in cases where the glands above the clavicle are enlarged, or there is evidence of secondary deposits in internal organs. The entire breast should be removed with a wide area of skin, the pectoral fascia, the axillary glands, and the fat and fascia running from the breast to the glands. The operator should always have before him the fact that the disease at an early stage spreads into the lymphatic spaces and channels and grows along them.

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# INJURIES AND DISEASES OF THE ABDOMEN.

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## INJURIES OF ABDOMEN.

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*Injuries* of the abdomen require special attention on account of their liability to engage important organs.

### CONTUSIONS WITH INTERNAL INJURIES.

A cart-wheel or the buffer of a railway carriage is the most frequent instrument of these injuries. *Symptoms*.—Marks of external injury. Severe shock owing to concussion of abdominal ganglia, with signs and symptoms of internal hæmorrhage and peritonitis. The history of the injury, taken in conjunction with collapse, the position of the pain and of the bruises (if there are any), and the following symptoms may indicate the injured organ. It may be said generally that when an organ is ruptured into the peritoneal cavity peritonitis results, and, when external to it, abscess.

*Liver*.—Dulness on percussion in hepatic region from hæmorrhage ; bilious vomiting ; white stools.

*Spleen*.—Splenic dulness.

*Stomach*.—Bloody vomiting.

*Intestines*.—The third part of duodenum, owing to its position and fixation to the spine, is the part most often ruptured. Tympanites, with the disappearance of liver dulness, indicate rupture into the peritoneal cavity.

*Kidney*.—Frequency of micturition, pain in loin shooting down to testicle and thigh, bloody urine.

*Bladder*.—Inability to urinate ; blood in any urine that is passed or drawn off.





## PENETRATING WOUNDS OF THE ABDOMEN.

What has been said of rupture of abdominal organs applies in a great measure to wounds. Occasionally we may get additional evidence of the nature of the injury by the escape externally of the contents or secretion of a particular organ. It sometimes happens that there is no escape from an intestine injured by a sharp instrument, owing to the wound being closed either by eversion of the mucous membrane or by the support of the adjoining parts; for it should be remembered that in the normal abdomen there is no peritoneal *cavity*. The quantity of omentum and intestines that may escape through a small external wound is remarkable.

*Treatment.*—When there are symptoms of serious internal mischief, but not of a degree to make interference hopeless, the injured locality should be exposed by an incision or by enlarging, if necessary, an already existing wound, and the condition then met with should be dealt with in the most thorough way the circumstance of the case will permit. In cases where there is an original wound—say a stab or a bullet wound inconveniently situated—it may be advisable, after enlarging it and ascertaining that it enters the abdomen, to deal with the complications it may have given rise to through a median incision. Bleeding points in the liver, or spleen, or kidney, should be ligatured, and gaping wounds brought into apposition by sutures. Wounds in the stomach or bladder should be sutured. Wounds in intestines may be closed with sutures or an artificial anus made, or where several adjoining loops of intestine have been perforated, an anastomosis between these loops may be effected. The general treatment to be employed in conjunction with operation, or alone where operation is contra-indicated, consists in absolute rest; fluid food in small quantities, and, in the shape of enemata when the stomach or intestines are injured; and opium.

## DISEASES OF THE ABDOMEN.

## PERITONITIS.

*Peritonitis* is, as a rule, a secondary disease, but it is so rapid in its onset, and its symptoms are so urgent, that the primary disturbance is liable to be lost sight of.

*Causes and Classification.*—It is dependent nearly always on infective processes, and the organisms concerned in these processes are the *Bacterium coli commune*, pyogenic cocci (chiefly streptococci), the pneumococcus, and the tubercle bacillus.

Tubercular peritonitis will be dealt with separately, and peritonitis dependent on the pneumococcus may be dismissed with the recognition that such a disease occurs, sometimes in connection with, sometimes independently of, pneumonia. There remain then the cases dependent on the *Bacterium coli commune*, and cases dependent on pyogenic cocci, and it will be better for clinical purposes to classify these as *cases due to infection from the intestines* (since it is from the intestines the *Bacterium coli commune* is derived), and *cases due to infection from without*. Under the former head will come peritonitis due to appendicitis, intestinal obstruction, perforation, &c. Under the latter, peritonitis caused by septic wounds or septic diseases of neighbouring parts, such as the uterus. Peritonitis is also classified according as it is *acute* or *chronic*, *diffuse* or *circumscribed*, and according as the inflammatory exudation is *plastic* (otherwise adhesive), *serous* or *purulent*.

*Symptoms.*—In considering the symptoms and progress of peritonitis the following points should be borne in mind:—1st, that the peritoneum is a lymph-sac with great powers of absorption, and that its surface is about equal in extent to the external surface of the body; 2nd, that while aseptic injuries of it are rapidly healed it is most sensitive to infection, and that





the extent and construction of its cavity render drainage of it very difficult.

*The Initial Symptoms* are sudden pain with shock and vomiting. The pain is referred to the neighbourhood of the umbilicus; the vomited matter, after the stomach has emptied itself of its contents, is bilious, and later becomes brownish and offensive; the collapse is profound. These symptoms are due to a disturbance of the great nerve centres of the abdomen (the solar and mesenteric plexuses), they are common to all acute cases, and they are not to be looked on as localising the initial mischief, since they really tend rather to mask it than reveal it. For this information one must look to the history and progress of the case.

*Further Symptoms* are—1st, *General Aspect*—Face pinched and anxious; attitude, helpless and restless on back, legs drawn up; respiration, thoracic. *Pulse* characteristically small and hard, and from 120 to 160. *Temperature* usually elevated, but collapse may depress it below normal. *Constipation*.—The bowels are, as a rule, powerless to act. The constipation is said to be adynamic, and is often of a degree to simulate obstruction. In some cases, however, diarrhoea occurs. *Tenderness*.—There is superficial hyperæsthesia as well as deep-seated tenderness. The patient often cannot bear the weight of the bed clothes. *Tympanites*.—At the outset the abdominal walls are flat and hard, but tympanitic distension soon sets in, varying in degree with the cause of the trouble. It is specially well marked in cases of intestinal obstruction; in cases of perforation it obliterates hepatic dulness; in cases where effusion occurs it is replaced in the flanks by dulness.

*Prognosis*.—The mortality is about 70 per cent. Toxæmia is the cause of death in acute cases, and some patients, after surviving that danger, succumb to pneumonia. Pelvic cases are the most favourable.

*Treatment*.—The treatment of peritonitis is best considered in connection with the diseases that give rise to it; but the

chief measures in use may be mentioned here. 1st, rest on back with pillow under knees; 2nd, fluids such as the patient wishes for may be given in spoonfuls by the mouth. He is best nourished by nutrient enemata, and eight or ten ounces of water by the rectum best relieves thirst; 3rd, *opium* should not be given as a routine treatment, it masks the symptoms; it is best given hypodermically where pain demands it; 4th, *Leeching*.—Leeches are undoubtedly useful in localised peritonitis; 5th, *Aperients*.—Where there is neither perforation nor obstruction aperients, either by mouth or as enemata, in many cases do good.

*Incision and drainage* are as applicable to pus in the peritoneal cavity as to pus elsewhere; they are very successful when the suppuration is circumscribed, and when it is diffuse they are the only remedies that give even a little hope.

#### TUBERCULAR PERITONITIS

Presents many difficulties of diagnosis. It is usually secondary to tubercle elsewhere. It begins insidiously and progresses with intermitting symptoms of chronic peritonitis, such as pain, vomiting and constipation alternately with diarrhoea. There may be long intervals of fair health. The abdomen swells and is puzzling. In some cases unusual areas of dulness and resonance are met with, the omentum thickened and matted into a ball feels like a tumour, while here and there are found circumscribed collections of fluid resembling cysts. In other cases fluid is plentiful and free in the abdominal cavity. Such cases are distinguished from cases of ordinary ascites only by the numerous miliary tubercles studding the peritoneum.

*Treatment*.—Chronic cases of the ascitic variety and those in which there are circumscribed collections of fluid (serous or purulent) are well treated by simple incision and emptying out of the fluid without either flushing or drainage. The fibrous forms are best left alone unless intestinal obstruction, to which they are liable, sets in. The general treatment of tubercular conditions should, of course, be applied to all cases.





## PERITYPHLITIS

Is a circumscribed peritonitis in the neighbourhood of the cæcum. It is usually due to some trouble in the appendix (*appendicitis*), such as a twisting of that tube, or the lodgment in it of a foreign body, but it may start in the cæcum itself. The *Bacterium coli commune* is, as a rule, the organism found in the effusion round the cæcum.

*Symptoms.*—A sudden onset of pain (at first referred to the neighbourhood of the umbilicus, later localised in the right iliac fossa), collapse, vomiting, and constipation. The temperature may be from  $99^{\circ}$  to  $103^{\circ}$ ; the pulse is small, hard and rapid. In the right iliac fossa there is evidence on careful palpation of deep-seated inflammatory swelling, and the abdomen generally is distended and tender. The attack lasts about a week, and then, as a rule, subsides. It may, however, terminate in suppuration—a circumscribed abscess or a general peritonitis. There is in this disease a peculiar tendency to relapse, so that one patient may have many attacks.

*Treatment.*—That of peritonitis, but the bowels must be acted on only by enemata till the acute symptoms have subsided. Should an abscess form it should be opened and drained through an incision over its most prominent point, or failing such a point through one parallel to outer half of Poupart's ligament and an inch above it. In relapsing cases the appendix, especially if it can be felt to be tender and swollen, may be excised during a period of quiescence.

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HERNIA.

*Hernia* means the protrusion of an organ through the walls of the cavity in which it is contained; but the term when unqualified, applies only to the abdomen, and is equivalent with "rupture." The essential parts of a hernia are the protrusion and its coverings. The part protruded is usually a portion of intestine (*enterocele*), ileum, jejunum, or colon, in this order of

frequency ; or of the omentum (*epiplocele*) ; or of both intestine and omentum ; but every one of the abdominal viscera, except the liver and pancreas, has at one time or another so suffered.

*The coverings* are—1st, the peritoneum ; 2nd, the other tissues which the hernia has stretched and pushed out in front of it. The peritoneal covering is the innermost and most complete, and constitutes the “sac.” The sac is of importance because, its cavity is in continuity with the general peritoneal cavity.

*Causes.*—Defects and weakness of, and whatever puts stress from within upon, the abdominal walls.

*Classifications* are clinical and anatomical.

*Clinical.*—A hernia may be—1st, reducible ; 2nd, irreducible ; 3rd, obstructed ; 4th, inflamed ; 5th, strangulated.

### REDUCIBLE HERNIA.

In this, the common form, there is a swelling, or, in advanced cases, a pyriform tumour with a neck. Its size and tension increase when the patient stands up, and there is an impulse on coughing. It is smooth, elastic, and tympanitic when it contains bowel ; uneven, “doughy,” and dull when it contains omentum. On reduction it returns smoothly, and often with a gurgle and a sudden finish that are distinctive. Omental herniæ are less satisfactory in their reduction than those containing gut. Reduction is effected by a combination of manipulation and pressure called “taxis.” With one hand the operator draws down the tumour and subsequently applies pressure upon it, while with the other he directs its course.

*Treatment.*—(a.) *Trusses* are, as a rule, only palliative in their effects, except in childhood, when, if constantly worn, and if, at same time, any existing cause of hernia, such as phymosis, be corrected, they often effect a radical cure. When applying a truss the patient should be lying on his back, and care should be taken that the hernia is completely reduced.

(b.) *Radical cure* by operation, of which there are many





methods, is, as a rule, safe and satisfactory. It may be undertaken when trusses are in any way objectionable, and when the general condition does not contra-indicate operation.

#### IRREDUCIBLE HERNIA.

The contents of the sac cannot be reduced. This may be dependent on adhesions; or on the size of the protrusion; or on a change in its shape, the neck diminishing and the further part increasing in size. The *treatment* consists either in the operation for radical cure, or in the support of a truss moulded to the part.

#### OBSTRUCTED OR INCARCERATED HERNIA.

The protruding bowel is blocked with fæces. This happens most commonly in umbilical herniæ containing colon.

*Symptoms.*—Pain, increase of tension and of size of tumour, vomiting, and constipation. The symptoms differ from those of strangulation chiefly in degree.

*Treatment.*—Where a radical operation is contra-indicated—rest; scanty fluid diet; an ice bag locally; and aperient enemata.

#### INFLAMED HERNIA.

Some injury sets up a sub-acute inflammation of the sac. Small irreducible herniæ, such as femoral epiploceles, are those most commonly affected in this way. Suppuration may occur.

*The Symptoms* are those of a localised peritonitis—very great tenderness over a hard, tense spot, with constipation; sometimes vomiting. It simulates strangulation, but the symptoms are not so urgent.

*Treatment.*—As in obstructed hernia.

#### STRANGULATED HERNIA

Exists when the protruding bowel or omentum is so constricted that it is irreducible, its circulation interfered with, and its functions arrested. The constriction may be either in the hernial rings—the common locality—or in the neck of the sac.

In either case it causes various degrees of congestion of the contents of the sac, culminating, if unrelieved, in the effusion of a certain amount of fluid in which the *Bacterium coli commune* is usually present, and finally in gangrene.

*Causes.*—The sudden addition of fresh intestine or omentum to an already existing hernia, or the sudden formation of a new hernia.

*Symptoms.*—*General*—Complete constipation, persistent vomiting, and colicky pains referred to the umbilical region. Whenever these symptoms occur the various hernial apertures should invariably be examined. *Local.*—A hernia, tender, irreducible, tense, and without impulse on coughing. Recent herniæ furnish the most acute, and omental herniæ the least acute, cases.

*Treatment.*—Taxis and Herniotomy.

*Taxis* is not much in favour at present. (a) It may injure the bowel. (b) The sac with the bowel strangulated within it may be returned (reduction *en masse*), or other conditions, causing a persistence of symptoms after reduction, may escape notice. (c) It delays herniotomy, an operation which, when not delayed, can be combined with one for the radical cure of the hernia. For these reasons it is wise not to waste much time over taxis. The refusal of the patient to submit to operation or some condition specially contra-indicating operation are the only justification for such measures as prolonged taxis, hot bath, inversion, applications of ice, aspiration, &c., &c.

*Herniotomy.*—The sac having been exposed, pinched up and opened, and fluid allowed to escape, the bowel is visible. After thorough irrigation of the exposed parts the finger is now passed up to the constricting point, usually the hernial ring, a blunt-pointed bistoury is guided along it, and the constriction is divided in the direction indicated by the anatomical relations of each kind of hernia. If the bowel is fairly healthy it is now returned, as is also any protruding omentum, but if the latter does not return easily it may be ligatured and





removed. The further steps of the operation are those for the radical cure of hernia.

*Gangrenous Intestine and its Treatment.*—If, after the strangulation has been relieved, the condition of the bowel is doubtful, it should be drawn down and the part impressed by the stricture examined, it being, as a rule, the part most seriously affected. A portion of gut, even though dark in colour, may be returned, provided it retains its glossiness and tends to improve in colour when no longer constricted. On the other hand, greenish-black intestine that is pulpy and lustreless, and that has been lying in dark foetid serum, must be treated in one of the following ways:—1st. Resection of bowel and re-establishment of continuity by means of sutures or Murphy's button. 2nd. Artificial anus, made either by laying freely open the gangrenous bowel *in situ*, or by drawing down the bowel, excising the gangrenous part, and then uniting by sutures the margins of the open bowel and the skin. When there is doubt as to the recuperative power of the bowel, as will often be the case when it bears the deep impress of a sharp stricture, the injured part should either be resected or should, after the full division of the stricture, be left outside the ring.

*Partial Enterocoele* is a condition described by Richter in which only a portion of the circumference of the gut is strangulated. It is most usual in femoral herniæ. The symptoms are not as well marked or acute as in ordinary strangulated herniæ, fæces often pass and the vomiting is not fæculent, but gangrene, owing to the tightness of strangulation and delay in diagnosis, is frequent. It is, therefore, a condition calling for operative interference, and often requiring resection of the bowel.

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## SPECIAL HERNIÆ.

## INGUINAL HERNIA

May be *oblique* or *direct*. It is called *oblique* when it enters the inguinal canal through the internal ring; *direct* when it enters it through its posterior wall at a point internal to the deep epigastric artery. Either of these varieties is called *incomplete* or a *bubonocoele* as long as it halts in the canal, when it descends further it is called *scrotal* or *labial*, as the case may be.

## OBLIQUE HERNIA.

Its varieties are—1st. *Acquired*. The hernia is in a sac lying in front of the vas deferens and spermatic vessels, and when *scrotal*, above and in front of the testicle. 2nd. *Infantile*.—The hernia is in a sac lying behind an imperfectly closed funicular process, both layers of which and the sac have to be divided before the hernia is reached. 3rd. *Congenital*.—The hernia is in the tunica vaginalis. 4th. *Funicular*.—The hernia is in the funicular process, and is shut off by an adhesion from the tunica vaginalis. 5th. *Encysted Congenital*.—The hernia is a sac formed by a septum stretched and invaginated into an imperfectly closed funicular process. 6th. *Hernia with undescended Testicle*.—The hernia and testicle lie in the inguinal canal. In this descent the hernia usually precedes the testicle.

*Diagnosis*.—A bubonocoele may be confounded with a bubo, a femoral hernia, an abscess, a hydrocele or hæmatocoele of the cord, or a retained testicle; a complete hernia with any of the conditions causing enlargement of the testicle (see Diseases of Testicle, p. 264).

*Treatment*.—As laid down for hernia in general, pp. 216 and 218.

## FEMORAL HERNIA

Is met with usually in adult women as a globular swelling bulging through the saphenous opening, upwards on Poupart's





ligament. It is often ignored, as it is usually small and gives little trouble, unless it becomes strangulated or inflamed—conditions to which it is peculiarly liable.

*Diagnosis.*—It has to be distinguished from enlarged glands, varix of the saphenous vein, psoas abscess, and inguinal hernia. The diagnosis from inguinal hernia is not easy in very fat females. In these cases the thigh should be well abducted, and the spine of the pubes felt for. If the neck of the sac is outside this point the hernia is femoral, and this is corroborated if the finger finds the inguinal canal free. The points diagnostic of other resemblances will be found under respective headings.

*Treatment.*—By *Trusses*. The pad should tail off over the femoral ring, and end in a perineal strap to be buttoned behind. This keeps the edge of the pad down in its proper place. When strangulation occurs operate early, as gangrene in this form of hernia is rapid in its onset. In operating the special points are—(a) A vertical incision over the inner margin of the neck of the hernia made by transfixion, the skin having been pinched up. (b) The division of the stricture by a few notches, made not too deeply, in an upward and inward direction at the junction of Gimbernat's with Hey's ligament. *Taxis* is best applied with the patient inverted and the thigh flexed, slightly abducted, and rotated inwards.

#### UMBILICAL HERNIA.

In infants umbilical hernia may be congenital or acquired—that is, the umbilical ring may be unclosed at birth, in which case there is danger of including a portion of the ileum in the ligature of the cord, or there may be after birth an accidental “starting of the navel” during some act of straining.

*Treatment.*—A pad secured by plaister is all that is, as a rule, required for either condition.

In adults only the acquired form occurs, usually in stout old women who have borne many children. As it increases i

becomes pendulous and lobulated, and its coverings become very thin. Omentum and the transverse colon are the parts usually protruded, and there is a tendency in the omentum to become irreducible from adhesions. Incarceration with obstruction, owing to the lodgment of fæces, is the most usual complication.

*Treatment.*—A truss or supporting belt. Where this is ineffectual a radical operation is indicated. It is a fairly successful operation, except in the case of large herniæ in very fat subjects. When incarceration occurs copious enemata, rest on the back, fomentations, and the discontinuance of food by the mouth are indicated. If these are not effectual operation must not be delayed, for fear of gangrene.

#### OBTURATOR HERNIA

Escapes along the obturator canal. It occurs most frequently in elderly women. It often escapes recognition. Even when strangulated it may not be recognisable till a laparotomy undertaken for relief of the resulting obstruction of the bowels, reveals its existence. The symptoms are a swelling which is below and internal to the femoral vessels, and the neck of which is below the ramus of the pubes, and pain along the course of the obturator nerves. The finger in the rectum or vagina may give knowledge of the situation.

*Treatment.*—The hernia may be reached by a median laparotomy, also by an incision over the interval between the pectineus and adductor longus, on separating which muscles the swelling will come into view.

#### DIAPHRAGMATIC, VENTRAL, PERINEÆAL, VAGINAL, PUDENDAL, SCIATIC HERNIÆ,

Are forms so rare that the information given by their names is sufficient for the present.

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# INTESTINAL OBSTRUCTION.

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INTESTINAL obstruction, unless qualified as *partial*, means a mechanical obstruction that interferes completely with the passage of fæces and flatus through the intestines. It may be *acute* or *chronic*, or the acute may spring suddenly out of the chronic.

## ACUTE OBSTRUCTION

Is generally due to some condition that causes strangulation as well as sudden obstruction, and is most frequent in the small intestines.

*The Symptoms* are sudden: 1st, severe pain referred to the neighbourhood of the umbilicus; 2nd, profound collapse; 3rd, vomiting, first of the contents of the stomach, then bilious, later stercoraceous; 4th, total constipation; 5th, abdominal distension; 6th, intense thirst; 7th, diminished secretion of urine; 8th, a temperature below normal.

## CHRONIC OBSTRUCTION

Is due to causes that slowly close the lumen of the intestines without occasioning strangulation, and is most frequent in the large intestines. The onset is gradual, with intermitting abdominal pain and vomiting, both tending to increase in frequency and severity. The constipation is at first not total, and there is sometimes diarrhœa, due to catarrh of the colon below the obstruction. Peristalsis is visible, throwing the bowel into coils. There is early and well-marked mæteorism unless when the small

intestines are the seat of the obstruction. The temperature and amount of urine are normal.

*Diagnosis.*—It should be noted that the foregoing symptoms, especially in the acute form, much resemble those of peritonitis (page 212). But in peritonitis, since the lumen of the bowel is not closed, the vomiting is less urgent and the constipation less absolute. Moreover, in peritonitis the pain is continuous and tenderness very great; there is often dulness in the flanks from effusion, and if collapse is not present the temperature is raised. It should be remembered, however, that, since *obstruction* often excites peritonitis, the two disorders are likely to co-exist.

The various pathological conditions giving rise to obstruction are classified as follows:—1st, external strangulation; 2nd, internal strangulation; 3rd, volvulus; 4th, intussusception; 5th, stricture; 6th, tumours and foreign bodies within the bowel; 7th, tumours, &c., external to the bowel. 8th, impaction of fæces. Of these eight classes of conditions the first four usually give rise to acute, the second four to chronic, symptoms. The following exceptions, however, must be made—intussusception, when not in infants, is often chronic; and foreign bodies, such as gall-stones, when impacted in the small intestines, usually cause acute obstruction.

As the treatment of each of these conditions is not the same it is necessary to refer to them separately.

#### EXTERNAL STRANGULATION.

This condition has already been dealt with under the head of Strangulated Hernia (page 217).

#### INTERNAL STRANGULATION

Usually affects the small intestines. The strangulation may be by bands, such bands as are formed when adhesions, the result of peritonitis, become stretched; when the omentum adheres to a hernial orifice or other part; when a Meckel's





diverticulum—*i.e.*, an imperfectly obliterated vitelline duct—exists; or when the vermiform appendix or Fallopian tube becomes adherent to neighbouring parts. The strangulation may also be through an aperture—*viz.*, an aperture in the omentum or mesentery, the foramen of Winslow, or into certain peritoneal pouches, the fossa duodeno-jejunalis, the ileo-cæcal fossa, the intersigmoid fossa.

*The Symptoms* of internal strangulation closely resemble those of external strangulation.

*Treatment.*—Early laparotomy and liberation of the bowel.

### VOLVULUS

Means a twist of the intestine that occludes its lumen. The loop is usually twisted on its mesenteric axis, and the sigmoid flexure is the part most commonly so affected. As a result, the involved coil becomes rapidly distended to an extreme degree.

*Symptoms.*—It occurs as a rule in patients between 40 and 60. The usual symptoms of obstruction are present, but not very acute, except meteorism, which occurs early and is very great.

*Treatment.*—Open the abdomen, tap the distended coil, and unfold the volvulus.

### INTUSSUSCEPTION

Means the reception of a part of an intestine, by inversion and descent, into a contiguous part of it. The external or receiving tube is called the *intussuscepiens*; the internal or received tube, the *intussusceptum*. There are four varieties: 1st. *Enteric.*—Small intestine into small intestine. 2nd. *Colic.*—Colon into colon. 3rd. *Ileo-cæal.*—Ileum and cæcum into colon. 4th. *Ileo-colic.*—Ileum through the ileo-cæcal valve. In this latter form, as the invagination increases, more and more of the ileum descends through the valve; in all other forms the intussusception grows at the expense of the external layer.

Intussusception may be acute or chronic; it may involve only a few inches of bowel, or it may involve the whole colon and protrude at anus. In acute cases, usual in infants, the

intussusceptum, owing to constriction of its mesentery, becomes greatly congested and discharges sanaceous mucus and the congestion quickly passes on to an inflammation that glues together the parts; and then to gangrene.

*Causes.*—Anything that excites irregular peristaltic actions—for instance, worms. Such actions occur occasionally just before death, and occasion intussusceptions distinguished by being multiple, easily reduced, and occurring both in the upward and downward direction.

*Symptoms.*—The disease is most frequent and most acute in childhood, and is indicated by a sausage-shaped tumour, which may be felt in the abdomen, and in advanced cases per rectum, intermitting colicky pains, and discharges from the rectum of bloody mucus.

*Treatment — General.* — Withhold food and give opium.  
*Mechanical.*—Distension of the bowel below the obstruction by means of hydrogen, air, or water, introduced per rectum, with the patient nearly or completely in the inverted position. This measure failing, laparotomy should at once be performed. The invagination having been reached, reduction is best effected by working chiefly from below. The apex of the intussusceptum is gently worked up, while the sheath immediately covering it is worked down. At the same time gentle traction may be made on the bowel above the invagination.

Failing reduction, the difficulty of the still existing obstruction may be met by resection of the invagination, by making an anastomosis, or by making an artificial anus—all desperate measures offering little hope. Late operation is, in acute cases, so unsuccessful that it is a question whether it is not better in late acute cases to allow gangrene to separate the intussusceptum than to interfere surgically.

#### STRICTURE

Is usually malignant (cylindrical epithelioma), or it may be consequent on injury, dysentery, syphilis, or tubercle.





*The Symptoms* are those of chronic obstruction. Palpation of the abdomen may indicate the position of the stricture. Visible peristalsis is also a guide. If it is situated in the colon, a distension of the rectum known as "ballooning" will be often present.

*Treatment—General.*—A careful dietary, laxatives, enemata, and massage. *Operative.*—1. Resection. 2. Artificial anus. 3. Anastomosis.

### TUMOURS AND FOREIGN SUBSTANCES WITHIN THE BOWEL.

Adenomata, or lympho-sarcomata in the shape of polypi, grow occasionally from the inner surface of the bowel and cause symptoms of chronic obstruction. The foreign substances met with are gall-stones, enteroliths, or foreign bodies the patient may have swallowed.

Gall-stones, when impacted in the most usual site—*i.e.*, high up in the small intestines—cause symptoms which resemble those of strangulation, but excepting vomiting, which is usually very great, they are not so acute. There may be the history of the passage of a gall-stone to help diagnosis. Other foreign bodies also cause acute symptoms when impacted in the small intestines; chronic symptoms when in the large.

*Treatment.*—Early laparotomy and removal of the obstruction.

### TUMOURS, &C., EXTERNAL TO THE BOWEL.

Most of the abdominal organs, if displaced, or if the seat of tumour or abscess are liable to press on neighbouring intestines and obliterate their lumen.

*The Symptoms* will be those peculiar to the primary disturbance combined with chronic obstruction, and the *treatment* will vary accordingly.

8th. *Impaction of fæces* is an affection of the large intestines, most frequently the cæcum, the sigmoid flexure, or the rectum. The predisposing conditions are those that favour constipation.

*Symptoms.*—The fæcal mass can usually be felt, and there are the usual symptoms of chronic obstruction.

*Treatment.*—Copious enemata in the knee and shoulder position, together with stimulation of the bowel by massage and electricity; glycerine enemata are sometimes useful. It may be necessary to do a laparotomy and to work on by manipulation, or to directly remove the fæcal mass.

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# DISEASES OF THE RECTUM AND ANUS.

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## CONGENITAL MALFORMATIONS.

1st. The anal aperture may be partially or completely closed. 2nd. The anus may be present and the rectum absent. 3rd. The rectum and anus may both be absent. 4th. The anus being absent the rectum may open into the bladder, urethra, or vagina. The *treatment* of these conditions consists in operations to establish either the natural perineal outlet, or an artificial anus.

## STRICTURE OF THE RECTUM

May be simple, syphilitic, or malignant. The following symptoms are common to all forms:—1st. There is difficulty and often pain in the passage of fæces, which as a rule appear flattened or grooved. This last symptom may, however, be absent when the stricture is situated so high up as to permit of the formation of a “motion” in the bowel below. 2nd. There may be tenesmus with discharge of sanious mucus, due to scybala, arrested at the narrowed point, setting up irritation. 3rd. A digital examination defines the condition when it is within reach of the finger. This is best made with the patient standing and resting one foot on a low chair. If the stricture is too high for the finger a bougie must be used. 4th. A ballooning of the rectum below the stricture is met with in old cases.

*Simple stricture* is due to cicatricial contraction consequent on injury, dysentery, or tubercle.

*Syphilitic stricture* is a tertiary affection more common in women than in men.

*Malignant stricture* is a symptom of columnar carcinoma of rectum. It is met with chiefly in advanced middle age.

These conditions have to be distinguished from one another by the history of the case, the period of life at which they occur, and the symptoms that distinguish simple from malignant affections in other parts of the body. Thus, when the disease advances rapidly with general cachexia, and the finger feels in the wall of the bowel irregular infiltrations, with edges thickened and breaking down in parts, the presence of cancer is plain.

*Treatment.*—In all forms of stricture the bowels, by means of regulated dietary and drugs, should be kept relaxed, not purged. Enemata of soap and water are often very useful. Stimulants, chills, and all causes of hæmorrhoidal congestion are to be avoided.

In addition to the foregoing simple stricture requires gradual dilatation with bougies, or in some cases linear proctotomy; and syphilitic stricture the treatment of tertiary syphilis. In malignant cases the question of operation arises, and this may be either palliative or radical in its aims. 1st. *Palliative*—Colotomy may be necessary to relieve obstruction, or to divert the fæces from too painful channels. It often materially relieves the patient's sufferings. 2nd. *Radical*—Excision of the malignant growth is advisable in about one in five cases. Those in which the posterior wall of the bowel is involved are the most tractable. The mode of operation of course depends on the extent and position of the disease. Tumours formerly considered too high up for removal are now reached through a transverse division of the sacrum.

#### ULCER AND FISSURE OF THE ANUS.

There is found at times, lying in the posterior mucous folds, within the orifice of the anus, a velvety patch of ulceration which one could cover with the point of the little finger. From this as a rule a small fissure extends downwards, crosses the sphincter, and terminates in a small external pile.





*Pathology.*—It is said to arise during defæcation either from a tear by stretching, or a tearing down of an anal valve.

*Symptoms.*—It occurs usually in debilitated women. Pain during and after defæcation, intense, radiating to neighbouring parts, and reacting on the general health, is the chief symptom.

*Treatment.*—The following measures may be practised separately or combined:—1st. Carry an incision through the floor of the ulcer down to and through the superficial fibres of the sphincter. 2nd. Forcebly distend the sphincter. 3rd. Snip off the “sentinel pile.”

### ISCHIO-RECTAL ABSCESS

May be acute or chronic. It may owe its origin to a perforation of the rectum, or in the case of persons in broken-down health a trivial disturbance of circulation and vitality in the ischio-rectal fossa may produce it. If left to itself it will open either externally or into the gut, or both ways. A fistula not seldom supervenes.

*Treatment.*—Early and free incision and drainage.

### ANAL ABSCESS.

In this case the pus is originally in the submucous tissue above the anus. It burrows superficially, and discharges itself into the bowel and also at a point external to the anus. These openings do not mark the limits of the area undermined.

*Pathology.*—It is often tubercular, or it may be started by an accidental perforation of the mucous membrane or other injury.

*Treatment.*—Lay it freely open, scrape its walls, and plug with iodoform gauze.

### FISTULA.

An ischio-rectal or anal abscess, narrowed into a sinus constitutes a *fistula in ano*. It is a true fistula, and is styled *complete*, when the sinus opens both on the mucous and

cutaneous surfaces. When it has only a cutaneous opening, *blind external*, and when it has only a mucous opening *blind internal* are the distinguishing terms. A fistula that burrows round the anus is sometimes spoken of as *horse-shoe*. Such a one, or one that burrows elsewhere, may have many external openings, but, as a rule, the internal opening is single. Tuberculous fistulæ are often associated with tubercle in the lungs and elsewhere. Not every sinus that opens near the anus is a fistula, for abscesses other than anal and ischio-rectal discharge themselves in this locality.

*The Symptoms.*—Tenderness and the unpleasantness occasioned by a constant discharge, is all the patient complains of, unless when the sinuses become inflamed, a not uncommon occurrence.

Examination for fistula is made by passing a finger into the rectum and a probe into the fistula. A blind internal fistula is suspected if there is a discharge of pus from the bowel, and if external pressure on a "suspicious" outside spot increases such discharge.

*Treatment.*—The fistula should be laid freely open into the bowel on a probe-pointed director passed in through the fistula, and then hooked down and brought out through the anus. Loose flaps of skin should be snipped off, and unhealthy granulation tissue scraped away. The wound should be plugged with iodoform gauze and made heal from the bottom.

### PILES.

*Piles* or hæmorrhoids are varices of the veins of the anus and lower part of rectum. The dilatations usually occur in patches—*longitudinal* or *globular*—and are embedded in thickened areolar tissue which gives slight substance to the small tumours. They are classified as *internal* and *external*, according as they are situated above or below the verge of the anus. In women, at times, in place of distinct hæmorrhoidal tumours, one meets with inereally patches of swollen and congested mucous membrane





that bleed periodically. *Causes.*—1st. All obstacles to free portal circulation, such as man's erect position, obstructions at the liver, constipation, pressure of tumours. 2nd. The unsupported condition during defæcation of the veins under consideration. 3rd. The fact that these veins are the most dependent radicals of the portal system, which is without valves. So much do these conditions tend to produce congestion in the neighbourhood of the anus, that it is probable man would never be free from such disturbance were it not that the hæmorrhoidal plexus can, when required, empty itself through the middle and inferior hæmorrhoidal veins into the internal iliacs.

*Symptoms.*—*External piles* are of little concern till they become thrombosed and inflamed, when they show themselves as livid, angry tumours, causing throbbing pain, especially on movement and during defæcation. *Internal piles* reveal themselves by a sense of weight and fullness about the anus, and by their tendency to protrude and to bleed during defæcation. Bright blood which has dropped on to the motion or squirted on to the side of the vessel is characteristic. Inspection of the mucous membrane of the bowel while protruded is, however, the proper means of diagnosis. Such protrusion may be brought about either by making the patient bear down or by gentle traction with a forceps. The negative evidence afforded by digital examination is useful, as it excludes epithelioma and polypus—diseases likely to be mistaken for piles; not so *prolapsus recti*—it can be distinguished only by inspection. Some prolapse accompanies the protrusion of all piles.

Internal piles are sometimes seen protruding in an inflamed state through the sphincter, by which they are nipped. They are livid, tense, and painful, and if the constriction is not speedily relieved, they may undergo spontaneous cure by sloughing off.

*Treatment.*—1st. *Palliative.*—Regulate the bowels and the dietary, interdict stimulants and instruct the patient not to delay over the act of defæcation, let chills and sedentary habits be avoided, and the bowel be washed out daily with an enema

of cold water. Locally apply ointment of tannic acid, hazeline cream, or injections of tincture of hamamelis.

2nd. *Radical*.—External piles may be snipped off, or when thrombosed they may be incised and the clot turned out. Internal piles may be removed—1st. By ligature. The sphincter having been stretched, the base of each pile is included in a very tight ligature, for the reception of which a semicircular groove is made beforehand by snipping into the submucous tissue on the side next the skin. It is a mistake to transfix and ligature in halves, as a vein may thereby be held open. When all have been ligatured each strangulated mass should be snipped off, and the stumps of sufficient size to support the ligatures, and dusted with iodoform, should be pushed back into the bowel. 2nd. By cautery and Smith's clamp. The sphincter having been stretched, each pile is drawn down by a catch forceps, its base clamped, and the projecting part removed by cautery; the stumps are dusted with iodoform and returned. 3rd. By Whitehead's method. The affected mucous membrane together with the veins is removed round the whole circumference of the bowel very much as in cancer of the rectum, and the edges of the wound are brought together with sutures.

*After-treatment*.—Take a catheter with you on paying first evening visit as retention of urine may require its use. Keep the bowels bound for five or six days, and then prepare for their action by injecting olive oil and giving a cocaine suppository.

*Strangulated* piles should be pushed back, and if this is not feasible they should be removed. If operation is refused, prescribe poppy fomentations and anodyne ointments.

Radical measures are inapplicable to patients suffering from cirrhosis of liver.

#### PROLAPSUS RECTI

May be partial or complete. The *partial variety* is a disease of adults. The mucous membrane only is protruded. It may





be caused by a relaxed state of the constitution, such as occurs in residents in the tropics, and by any condition that produces tenesmus, whether hæmorrhoids, dysentery, or stone in the bladder. Strangulation of the prolapse ending in gangrene may occur.

*Treatment.*—The palliative treatment is the same as in piles. When necessary the prolapse may be removed, or the relaxed bowel narrowed, by any of the operations for piles.

*Complete prolapse* is a disease of childhood. All the coats of the bowel are protruded. It is an intussusception of the rectum, and may be distinguished from the partial variety by the fact that in the latter the finger or probe cannot be passed up between the sphincter and the prolapse. *Causes.*—Whatever causes straining in weakly children, such as worms, diarrhœa, phimosis, &c.

*Treatment.*—Removal of the cause, support with a T bandage, and by lateral pressure with hands during defæcation, recumbent position. In any radical operation the likelihood of opening into the peritoneal cavity must be remembered.

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# INJURIES AND DISEASES OF KIDNEYS.

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## INJURIES OF KIDNEY.

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### CONTUSIONS AND LACERATIONS

May involve the kidney to any degree. *Symptoms.*—Pain in the affected region, shooting down to the bladder and testicle, together with frequent painful and sanguineous micturition. If there is complete suppression of urine the implication of both kidneys is indicated. *Treatment.*—Limit the consumption of fluid, and keep the patient at rest; give morphia if there is much pain; if there is hæmorrhage give ergot, and apply ice locally. Should there be hæmorrhage to a dangerous degree, or effusion of urine into the peritoneal cavity, an incision in the loin should be made with a view to drainage, and to see whether or no nephrectomy is indicated.

### PENETRATING WOUNDS.

The symptoms are somewhat the same as in contusions, but there is more danger of hæmorrhage and of peritonitis and perinephritic abscess from urinary extravasation. The escape of urine by the external wound makes the diagnosis certain. *Treatment.*—Cleanse and drain the wound thoroughly, and keep the patient at rest in the position most suitable for drainage.

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## DISEASES OF KIDNEY.

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### FLOATING KIDNEY

Is a rare congenital condition, in which the peritoneum completely envelopes the kidney, and forms a meso-nephron. *Movable kidney* is an acquired condition, most frequent in women, and





on the right side, in which the kidney moves, often to a considerable extent behind the peritoneum. *Symptoms*.—Colicky pains and other gastric and intestinal disturbances ; a movable kidney-shaped tumour, and a resonant recess in the vacated site. *Treatment*.—If a suitable binder and rest do not give relief, the kidney should be fixed in its proper place by sutures.

#### HYDRO-NEPHROSIS AND PYO-NEPHROSIS.

In hydro-nephrosis the pelvis of the kidney is distended, and the substance gradually destroyed by the pressure of retained urine. *Causes*.—Any obstruction, either congenital or otherwise, to out-flow. When the obstruction is in the ureter impacted calculus and cancer of the uterus are the most common causes. Pyo-nephrosis may be a development of hydro-nephrosis, or may be excited directly by injury, calculus, or gonorrhœa. *Symptoms*.—A fluctuating tumour in the flank, which yields urine, or pus and urine, on being aspirated. Decomposition of urine in the ureters and pelvis of kidney may be suspected when offensive urine is found in the bladder shortly after it has been washed out. *Treatment*.—Aspiration, nephrotomy, or nephrectomy.

#### ABSCESS OF THE KIDNEY.

The pus is situated primarily in the substance of the kidney. It may be due to the union of miliary abscesses, to calculus, to injury, to pyæmia, or it may be secondary to septic disease of the bladder, the lymphatics of which are continuous through those of the ureter with the superficial lymphatics of the kidney. It may or may not discharge itself through the urinary channels. *Symptoms*.—Pain and swelling in the loin, with the constitutional symptoms of the formation of pus. *Treatment*.—Same as pyo-nephrosis. Boracic acid in 10-gr. doses is often of benefit.

#### RENAL CALCULUS.

A urinary calculus, wherever formed, is due to a precipitation of salts from urine, abnormal in character, either owing

to—1st, some constitutional cause; 2nd, some local condition producing decomposition. In the first instance, we have calculi of uric acid or its salts, or of oxalate of lime, or of cystine, or of these substances variously combined; in the second, calculi of ammonio-magnesian phosphate, or of phosphate of lime. In a large number of cases constitutional and local causes combine to form calculi of a mixed kind. When the precipitate is not concreted into a mass it is, if impalpable, called *sediment*, and *gravel* if gritty.

In the kidney a calculus may form in the tubes, calices, or pelvis, and it may either there grow, or it may be discharged through the ureter.

*Symptoms.*—A calculus while in the kidney, if not encapsuled and latent, excites pain in loin extending to testicle and thigh, and frequency of micturition, with blood or pus in urine. A calculus descending through ureter causes somewhat similar symptoms, but they are so intense as often to cause collapse, and are sudden in their onset and subsidence. They are inclined to recur as the stone changes its position, and are known as “renal colic.”

*Treatment.*—If the condition is serious, and solvents such as potash, lithia, piperazine have failed, the question of nephro-lithotomy is to be considered. Renal colic is treated with hot baths, fomentations, warm diluent drinks, and morphia hypodermically.

#### TUBERCLE OF THE KIDNEY,

Except in the acute miliary form, which does not concern the surgeon, begins in the tubes, passes along their ramifications, and secondarily engages the cortex. The resulting caseous tissue, in some cases, softens and is discharged, leaving wedge-shaped cavities; in others, it becomes inspissated and converted into a putty-like material, which may distend the organ to a great size. The morbid process, as a rule, engages the ureters, which may become thickened and impervious, and also extends to the bladder, which, in advanced cases, is found ulcerated and studded with tubercular nodules. Both kidneys are often affected. *Symptoms.*—Frequent passage of urine containing pus, and perhaps

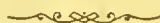
tubercle bacilli; pain in the loins; and in the later stages, hectic fever, with physical signs of a tumour or abscess in the loins  
*Treatment.*—The usual constitutional treatment of tuberculous disease. If pyo-nephrosis or peri-nephritic abscess exists incision and drainage will give relief. Nephrectomy is permissible only when there is proof that the other kidney is sound.

#### TUMOURS AND CYSTS

Of the kidney are often difficult of diagnosis. They may be distinguished by a bi-manual examination and by their being usually rounded in every part, and having large intestine in front of them. Tumours are usually sarcomata or carcinomata. Cysts requiring surgical treatment are rare. *Treatment.*—Nephrectomy, if performed early, often gives relief.

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# INJURIES AND DISEASES OF THE URETHRA.



## INJURIES OF THE URETHRA.

### RUPTURE

Of the urethra occurs most often in the bulbous or membranous portion, commonly from kicks or falls on the perinæum. Fracture of the pubis, and straining to pass water when a stricture exists, are also causes. *Symptoms.*—Painful and difficult micturition, perhaps retention, hæmorrhage from urethra, an ecchymosed swelling in the perinæum, and later on, signs of extravasation of urine. *Treatment.*—In doubtful cases, tie in a catheter and watch for extravasation. When there is no doubt as to rupture, cut down on the injured part, pass and tie in a catheter, and, as far as possible, close around it, with the help of sutures, the torn edges of the urethra. Do not remove catheter for five or six days. Then teach patient to draw off his water with a suitable instrument, and warn him of the danger of traumatic stricture.

### FOREIGN BODIES IN THE URETHRA.

Portions of broken catheters, and other foreign bodies in the urethra may call for removal. In very young children the impaction of a calculus is not an infrequent occurrence, either at the bulb or in the navicular fossa. *Treatment.*—Adopt whichever of the following courses appears most suitable: 1st, removing it with a suitable forceps; 2nd: pushing it to a convenient place and cutting down upon it; 3rd, pushing it back into bladder and crushing it with a lithotrite.

## DISEASES OF URETHRA.

## SIMPLE URETHRITIS

May be excited by acid urine in a gouty subject, by contact with leucorrhœal discharges, by alcohol, by stimulating lotions, or by the passage of instruments. The symptoms and treatment are as in a slight attack of gonorrhœa, from which it is to be distinguished by the mildness of the symptoms and the absence of the gonococcus in the discharge.

## GONORRHŒA

Is an infective inflammation of the urethral and certain other adjoining mucous membranes. The specific organism is styled the gonococcus. It is a diplococcus, and is seen as two reniform members placed hilus to hilus. With it, in severe cases, the ordinary organisms of suppuration are associated, and it is probably to the latter that suppurating buboes and some other complications are due. *Symptoms.*—1st, stage of incubation—three to five days after exposure to contagion there is a feeling of heat at the orifice of urethra, the lips of which are inflamed and gummy; this lasts about twenty-four hours; 2nd, stage of acute inflammation—the inflammation increases and spreads backwards, and the following symptoms develop: scalding micturition, profuse muco-purulent discharge, painful erections at night (called *chordee*, i.e., cord-like swelling of urethra), febrile disturbance; 3rd stage, subsidence—After a fortnight or so the acute symptoms tend to subside, and they may do so completely in about three weeks, or they may degenerate into a *gleet*. The slight chronic discharge known as a *gleet*, may be of indefinite duration, and is liable to exacerbations when the patient takes alcohol or commits any excess. It is probably due to the contagion lingering in some of the many glands and ducts connected with the urethra, and also to the formation of granular patches in the urethra.

The Treatment of acute cases should, in the early stages, be antiphlogistic, with alkaline diluents and complete rest. In the stage of subsidence, sandal wood oil, copaiba or cubeba are usually prescribed, together with an antiseptic or astringent injection. such as—R. Oxidi zinci gr. xx., Boro glycerini ℥iii., Lap calamin præp. gr. lx., Mucilary trag. ℥iiss., Aquæ rosæ ad. ℥vi.—Ft. injectio. Use only after making water (three or four times daily). For gleet, in addition to injections, sea bathing, change of air, tincture of perchloride of iron, and the occasional passage of a full-sized sound are beneficial.

The more common complications and sequences of gonorrhœa are as follows:—*Chordee*, a twisted erection of penis occurring at night, and best treated with cold, locally, and either bromide of potash gr. xx., or a suppository of opium, gr. i., camphor gr. x.

*Prostatitis*, *Cystitis* engaging chiefly the neck of the bladder, and inflammation of the *vesiculæ seminales* occur from the urethral inflammation extending backwards. Frequent micturition, strangury and febrile disturbance are symptoms common to these conditions. The state of the prostate and *vesiculæ seminales* must, therefore, be distinguished by a digital examination per rectum. *Treatment*.—Leeches and fomentations to the perinæum, hot hip-baths, morphia suppositories, diluent drinks, with boracic acid gr. x., morning and evening.

*Retention of urine* from inflammatory engorgement may occur. If so, apply a hot wet compress to the penis, leeches to perinæum, inject a warm weak solution of cocaine, and then try and steal in a small soft rubber catheter. If these means fail supra-pubic aspiration may be necessary.

*Peri-urethral abscess* may form, due to suppuration, in one of the glands opening into the fossa navicularis, or into the bulbous portion. If the abscess does not empty itself readily into the urethra it should be opened externally.

*Bubo*.—The glands in groins may become slightly enlarged and tender, but they seldom suppurate. If they do they must be opened.





*Epididymitis*.—One testicle often becomes acutely inflamed about the third week. Local blood-letting, by means of puncture, with general antiphlogistic treatment is indicated during the acute stage; later on “*strapping*.”

• *Conjunctivitis* easily produced by direct infection must be guarded against by cleanliness. It is treated of in works on the eye.

• *Rheumatism*, perhaps due to blood poisoning by the gonococcus, occurs not unfrequently during the third stage. The knee is the joint most commonly affected. There may be much effusion. The treatment is that of ordinary rheumatism, giving iodide of potassium an early trial. Incision and drainage give good results..

• *Balanitis*.—The mucous membrane of the prepuce and glans penis may become inflamed and give rise to phimosis (*vide* p. 251).

• *Warts* on the glans penis or labia often result from gonorrhœa. If glacial acetic acid fails to remove them they should be snipped off.

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## STRICTURE OF THE URETHRA.

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### STRICTURE

May be *organic*, *congestive*, or *spasmodic*, and all three conditions are often combined in one case, as when alcoholic excesses or chills cause congestion and muscular irritability at a strictured point.

• *Organic stricture*, though sometimes traumatic, and sometimes due to urethral chancre, is usually the result of gonorrhœal inflammation extending, at certain points, to the submucous tissues of the urethra. The cicatricial tissue so called into existence constitutes the stricture. It may stretch across the canal as a thin membrane, *lineal* or *bridle stricture*, or around it either as a narrow band, *pack thread*, or as a broad, hard band, *indurated annular*. It may form on any side of the canal, usually the floor, as a crescentic septum; or it may narrow the canal for a considerable

distance in a tortuous way. The part of the urethra most frequently narrowed by a stricture is the first inch of the spongy portion. The membranous portion is rarely, the prostatic never affected.

The remote effects of stricture are illustrated by the following report taken from the Pathological Register of St. Vincent's Hospital:—

F. S., age 45.—In the bulbous portion of the urethra there was a very narrow, hard stricture. Behind it the urethra was dilated. The bladder was *hypertrophied, fasciculated*, and at a few places on the posterior wall the mucous membrane was pushed between the ridges of muscular fibres so as to form *saculi*. Both ureters were much thickened and dilated, but not owing to regurgitation, as the valves were competent. The condition of kidneys was uniform, and as follows—pelvis dilated; pyramids injected, and partially absorbed; cortex of normal thickness, pale and mottled, and presenting a few yellowish spots resembling pus. A microscopical examination showed growing connective tissue surrounding slightly distended tubules. All cavities contained putrid urine, pus and mucus. *Surgical kidney* is a term often applied to these secondary nephritic changes.

*Symptoms.*—Frequent micturition, incomplete emptying of the urethra, change in shape of stream, and gradual diminution of its size, ending, perhaps, in retention. Later on, symptoms of cystic and nephritic trouble appear owing to decomposition of residual urine.

*Diagnosis* of the size and position of the stricture is best made by introducing a graduated conical-headed sound about the size of the stream the patient passes.

*Treatment.*—1. Gradual dilatation. 2. Continued dilatation. 3. Divulsion. 4. Electrolysis. 5. Internal urethrotomy. 6. External urethrotomy. 7. Perineal section.

1. *Gradual Dilatation.*—Beginning with the largest instrument that can be passed with ease, the size is increased every few days, never forcing a passage, till No. 14 (English) is reached.





2. *Continuous Dilatation*.—A catheter is tied in and replaced by a larger one every second day. This plan is indicated where introduction is difficult on account of false passages or other causes, and where time is an object.

3. *Divulsion* by Holt's or other dilator. The instruments explain themselves.

4. *Electrolysis*.—That electrolysis causes the absorption of inflammatory products more quickly than does simple pressure is doubtful.

5. *Internal Urethrotomy*.—The stricture is divided by means of a sheathed knife passed down the urethra. Maisonneuve's eurethrotome, made so that the floor of the urethra can be incised by means of it, is the instrument at present most in use. It is to be employed in cases that in any way resist dilatation.

6. *External Urethrotomy*.—The stricture is divided from without upon a staff passed through it into the bladder. It is indicated in cases of extravasation of urine, of perineal fistula, and of traumatic stricture.

7. *Perineal Section*.—When a stricture will not allow an instrument to pass, the best course is to cut into the urethra immediately in front of the stricture, and to pass into whatever openings there is a fine-pointed director, and on it divide the stricture. A full-sized catheter is then used. This is Wheelhouse's operation. Cock's operation relieves retention more directly. The operator passes his left forefinger into the rectum, and, using it as a guide, passes a knife exactly in the middle line towards the neck of the prostate, with the object of striking the urethra. Through the opening so made a large probe-pointed director is passed into the bladder to act as a guide for a female catheter, which, when inserted, should be tied in, and not plugged.

#### CATHETERISATION.

*Before passing a sound or catheter into the bladder consideration should be given to the fact that it sometimes excites, especially*

on first occasions, a disturbance of the urinary system likely to be aggravated if the patient is soon after exposed to chills.

The following preliminaries should be attended to, viz.:—The hands of the operator and the orifice and neighbourhood of the urethra should be cleansed; the instrument should be made aseptic, warmed, and oiled; and in irritable subjects and difficult cases half a grain of cocaine, dissolved in a drachm of water, should be injected into the urethra, and retained there for a few minutes. The instrument should be passed with the greatest gentleness, and when opposition is met with withdrawn a little, so as to test the nature of the obstacle. If it is found slightly grasped it is an indication that the point has entered a stricture, and is in the right direction; gentle pressure may, therefore, be made. If, on the other hand, the point is quite free its direction, after slight withdrawal, should be changed. To introduce a hard instrument stand on the left side of the patient lying down, support and slightly stretch the penis with the left hand while the instrument, with its concavity towards the left groin, is gently guided down the passage as far as the triangular ligament, then the handle is carried to the mesial line, and gradually depressed between the legs till the point is felt free in the bladder. Strictures apart, the instrument, especially if a small one, may hitch for the first few inches in a lacuna in roof of urethra, next when on a level with the triangular ligament, and again at the entrance to the bladder. To avoid these difficulties keep to the floor of the urethra for the first three inches, and to the roof for the rest of the passage. When the object is to merely draw off the patient's water, and when there is no contra-indication, select a soft rubber catheter, No. 8 (English).

The passage of a catheter, or any interference with the urinary passages, such as washing out the bladder, may be followed either at once or in a few hours by an attack resembling ague. Sometimes the attacks recur, and are of serious import. There is in connection with them a disturbance of the kidney, due, no doubt,

to reflex irritation of the renal nerves. Such disturbance is, as a rule, functional and transitory, but in kidneys, already diseased, the congestion may pass into severe, and even suppurative inflammation. The other dangers connected with catheterisation are false passage and hæmorrhage. A false passage is a difficulty in the way of all subsequent use of instruments; it is not, however, owing to its direction and to its being in front of the stricture, often productive of extravasation of urine.

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## RETENTION, INCONTINENCE AND EXTRAVASATION OF URINE.

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### RETENTION

May be due to :—1st, *Obstructive Causes*—Impacted calculus, common in boys; stricture, common in men of middle life; enlargement of the prostate, common in elderly men. 2nd—Defective expulsive force from paralysis, atony, muscular weakness as in fever and hysteria; or reflex inhibition after certain operations. *Symptoms*.—In acute cases there is urgent desire and straining to micturate, with a tumour evident on percussion and palpation above the pubes. In chronic cases there is a chronic dribbling from the bladder, the “incontinence of retention.” *Treatment*.—In obstructive cases, if the retention can be relieved by overcoming the cause of the obstruction so much the better; a calculus should be removed (*vide* p. 259); an enlarged prostate circumvented (*vide* p. 263); a stricture dilated by coaxing through it a fine instrument. In nearly all difficult cases a hot bath, an opium enema, and an anæsthetic during operative interference will be useful. If these means fail, and if the urgency is great, exit may be given to the urine by—1st, aspiration above the

pubes; 2nd, by perineal section. The old treatment of tapping the bladder through the rectum is not now practised.

*Incontinence of urine and frequency of micturition* are, of course, only symptoms of disease, but as such they require separate consideration.

### INCONTINENCE OF URINE.

Some children suffer from nocturnal incontinence. It is a functional disorder, for which, in some cases, there appears no cause; in others it is due to phimosis, intestinal worms, or acidity of the urine. If there be frequency of micturition or incontinence during both day and night, stone in the bladder or weakness of the urethral sphincter should be suspected. It is a disturbance that seldom continues beyond puberty.

In adult life true incontinence, distinct from overflow, is due to either some affection of the spinal cord or to some organic disease at the neck of the bladder.

*The treatment* of "nocturnal incontinence" consists in removing all probable causes, in putting the child to sleep on a hard bed, and in taking it up for several consecutive nights just before the time at which the occurrence is known to take place. A weak sphincter should be stimulated by the passage of a catheter or by electrolysis.

### FREQUENCY OF MICTURITION

Is a symptom of inflammation and many other diseases of the bladder, kidney, and prostate, and is also due to reflex irritation of the bladder when neighbouring organs are diseased. In not a few cases it is a sign of an over-distended bladder. The patient may be suffering from atony of the bladder due to senile degeneration or to obstructive diseases, such as hypertrophy of the prostate or stricture; and as a consequence the bladder is unable to empty itself, and the frequent calls to micturate are of the nature of an overflow.





*Treatment.*—Treat the cause of the disturbance. In atony of the bladder the patient should be taught to pass a soft catheter with all antiseptic precautions, and should do so twice daily in cases where all contractility is lost.

### EXTRAVASATION

May be due to—1st, unrelieved retention, causing rupture of the urethra; 2nd, injury; 3rd, the opening of an abscess into the urethra.

The extravasated urine usually takes a course forward into the perinæum and scrotum, and then up between the pubic spine and symphysis until it reaches the abdomen, being directed in its course by the deep layer of the superficial perineal fascia. This happens even when the rupture is between the layers of the triangular ligament, for the anterior layer, as a rule, gives way and allows the urine to make its way forward.

*Symptoms.*—The invaded parts become distended, œdematous, and red, and unless relieved rapid and extensive sloughing takes place. There is, of course, much constitutional disturbance.

*Treatment.*—Perineal section with division of the stricture when there is one (*vide* p. 243), and the passage of a catheter into the bladder. The catheter should be left unplugged. Exit should be given by means of free incision to all extravasated urine.

### PERINEAL ABSCESS AND URINARY FISTULA.

Abscesses are liable to form in the perinæum as the result of gonorrhœa, of circumscribed extravasations of urine behind strictures, or of injury by instruments.

An abscess once formed is, unless speedily opened and drained, liable to form a fistula, since a fistula is usually nothing more than the track of a partially healed abscess that has opened both into the urethra and externally. The internal opening of a fistula is usually behind a stricture. Externally the openings may be multiple, and may occur wherever extravasated pus or urine has

pointed. *Treatment.*—Perineal abscesses should be opened as soon as detected.

For the cure of fistula the first step is the removal of any obstructing stricture in the urethra, by any of the usual methods, preferably by perineal section when the external openings are multiple. Second step—Teach the patient to pass a catheter, and let him on all occasions draw off his water. Third step—Lay open tortuous passages, and scrape, cauterise, or otherwise stimulate those that are straight and callous.

*Penile fistula* may require a plastic operation.

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## DISEASES OF THE PENIS.

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### HYPOSPADIAS

Is a congenital defect which leaves the urethra more or less unclosed on its under surface. 1st. The cleft may engage only the glans and prepuce. 2nd. It may extend to the root of the penis. 3rd. It may pass through the scrotum and cause the urethra to open into the perinæum, making the male genitals, since in such cases the testicles are retained and the penis undeveloped, like in appearance to those of the female (*Hermaprodism*). *Treatment*.—A cleft of the first degree may, and of the third degree must, be left alone. In the second degree closure of the fissure by a plastic operation is feasible.

### EPISPADIAS.

In this, a rarer defect than hypospadias, the cleft is on the upper surface of the penis. It is nearly always associated with ectopia vesicæ, in the operative cure of which its treatment is included.

### PHIMOSIS

May be due to a congenital narrowing of the orifice of the prepuce, or to an inflammatory œdema excited by gonorrhœa or by syphilitic sores. Congenital phimosis obstructs the urinary passages, and by favouring the retention and decomposition of the smegma preputii, causes irritation of the glans penis. In one or other of these ways it may predispose to hernia, prolapse of rectum, hydrocele, priapism, masturbation, or incontinence of urine. *Treatment*.—The operation of circumcision is one to be com-

mended to patients with long and tight foreskins. It is preferable, except in special cases, to the two other means of overcoming the defect—1st. Slitting up the prepuce; 2nd. Dilatation of the prepuce.

#### PARAPHIMOSIS.

In this condition a tight foreskin that has been drawn back and cannot be got forwards, strangles the glans penis. *Treatment.*—If reduction by manipulation fails, divide by a small vertical incision the constriction, which may be brought into view by retracting it on to the body of the penis.

#### BALANO-POSTHITIS,

An inflammation of the glans and prepuce due to decomposed smegma, gonorrhœa, or venereal sores, also, in a chronic form, to gout. *Treatment.*—Support the parts and keep them clean by frequent injections of weak Condyl's fluid. If venereal sores are suspected, slit up the prepuce. A liability to this condition makes circumcision advisable.

#### CARCINOMA (SQUAMOUS) OF PENIS

Begins on the glans or prepuce either as a flat nodule or as a wart. It is to be diagnosed from papilloma by its infiltrated base, and from chancre by its history and behaviour under treatment. *Treatment.*—Circumcision or amputation of penis, depending on the situation and extent of disease. If fully removed it is not very liable to recur.

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# INJURIES AND DISEASES OF THE BLADDER.

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## INJURIES OF THE BLADDER.

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### WOUNDS OF THE BLADDER

May be inflicted—1st, from without, by bayonet, bullet, or fractured pubis, and most easily when the organ is full; 2nd from within, by catheter, lithotrite, or other surgical instrument, and most easily when the organ is empty. They may be penetrating or non-penetrating.

### RUPTURE

May occur when unusual pressure is in any way applied to an over-distended bladder. The opening in the bladder, whether from wound or rupture, may or may not communicate with the peritoneal cavity.

*Symptoms.*—If a patient with a distended bladder, or one in a drunken state, receives any injury likely to wound or rupture that organ, and if it is followed by collapse and inability to micturate, a catheter should at once be passed. Should only a little bloody urine flow, the diagnosis is clear: it is, of course, equally clear in cases where urine flows through an external wound. The question of whether the opening in the bladder does or does not communicate with the peritoneal cavity must be decided by the course taken by the catheter after its introduction into the bladder, and by locating by palpation, percussion, digital examination of the

rectum, &c., the extravasated urine. In cases not seen for a few days, the existence of cellulitis or peritonitis will throw light on the subject.

*Treatment.*—1st. Drain the bladder by tying in a catheter, or, when a stricture bars the usual channel, by means of a perineal incision and drainage tube. 2nd. In intra-peritoneal cases a laparotomy should be at once performed with a view to washing out the peritoneal cavity, and closing the opening in the bladder. 3rd. In extra-peritoneal cases free exit should be given, by means of incisions, to extravasated urine; and the opening in the bladder, when feasible, closed. 4th. In cases where the position of the rent is doubtful, an incision, as in supra-pubic lithotomy, should be made, and the anterior wall of the bladder examined. If this gives no information, the bladder should be opened, examined from within, and the condition found dealt with as above.

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## DISEASES OF THE BLADDER.

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### ECTOPIA VESICÆ—

Extroversion of the bladder—is *the only congenital defect* requiring notice. In this condition, much more frequent in boys than in girls, there is a failure of development in the anterior wall of the bladder and the corresponding abdominal walls, and the posterior wall of the bladder is seen bulging forward as a florid, moist mucous surface, with two openings below, from which urine is constantly dropping. The floor of the urethra is also exposed, the symphysis pubis being absent, and the penis in the condition of epispadias.

*Treatment.*—The extroverted surface may in some cases be closed in by means of flaps from the adjoining parts, turned with their skin surfaces towards the bladder, and secured in their positions with hare-lip pins.

## ACUTE CYSTITIS.

In the bladder, as elsewhere, acute inflammation is not, as a rule excited by aseptic injuries. It is due to the introduction from without, usually on surgical instruments, of putrefactive or pyogenic organisms, or to the extension from the urethra of gonorrhœal or septic inflammation. Residual urine and chronic congestion from any cause predispose to infection, and delay recovery.

*Symptoms.*—Frequent and imperative calls to micturate, painful micturition with tenesmus, tenderness of bladder, urine alkaline, and containing mucus, pus, and sometimes blood. There is little or no disturbance of temperature unless the inflammation has extended to the prostate, ureters, or kidney.

*Treatment.*—Fomentations, hot baths, morphia and belladonna suppositories, milk diet, boric acid in ten-grain doses by the mouth. At the same time the predisposing causes, if such exist, must be dealt with.

## CHRONIC CYSTITIS

May be a termination of an acute attack, or it may be due to such chronic causes of irritation as stricture, enlarged prostate, calculus, gout, &c.

*Morbid Anatomy.*—The mucous membrane of the bladder is grey and thickened, and in cases of stricture, and some cases of prostatic disease, may be bulged into sacculi between hypertrophied muscular bands. These sacculi greatly interfere with the cleansing of the bladder by any means. In other prostatic cases there is a general dilatation of the bladder, with atrophy of its muscular wall.

The *symptoms* are, but in a mild degree, those of acute cystitis. The urine tends to become ammoniacal and loaded with viscid mucus, constituting catarrh of the bladder. The inflammation, when there is a chronic obstruction, may spread to the ureters and kidneys, and cause "surgical kidney" (*vide* p. 244).

*Treatment.*—In all dealings with the bladder practise the most careful asepsis. Remove, as far as possible, all local causes of

irritation. With the help of a soft rubber No. 8 catheter and a four-ounce syringe, wash out the bladder daily with a boric or other mild antiseptic solution. Give occasional ten-grain doses of boric acid by the mouth. Forbid stimulants, and let milk be the chief article of diet.

#### TUBERCULAR DISEASE OF THE BLADDER.

In the bladder this disease usually occurs as an extension from the testis, prostate, or kidney; or as a part of a general tuberculosis. The ulcers are usually superficial, with yellow granular surfaces. They are to be looked for round the orifices of the ureters and about the trigone.

*Symptoms.*—At first frequency of micturition increased at night, and slight hæmaturia. Later on, in addition, micturition becomes painful, and pus appears in the urine. When these symptoms appear between the ages of fifteen and forty in a patient without stricture or calculus, at once examine the testicles and, per rectum, the prostate and vesiculæ seminales. Also examine the urine microscopically. Should tubercle bacilli be found, it remains only to decide as to whether the bladder or kidney is the locality affected. This may be cleared up by the use of the cystoscope. A tumour and pain in the loin, a large quantity of pus, and acid urine distinguish kidney trouble.

*Treatment.*—In the early stages leave the bladder alone, and recommend the constitutional treatment of tubercle, including sea air and sea bathing, and the avoidance of alcoholic stimulants. In the late stages, if the suffering is great, relief may be given by perineal or supra-pubic drainage of the bladder.

#### TUMOURS OF THE BLADDER.

*Malignant tumours* are more often met with in the bladder than non-malignant, but neither are common. The favourite site of both is the neighbourhood of the trigone.

*Sarcoma* is rare.





*Carcinoma*.—More than half of all growths in the bladder come under this head. It is squamous-celled when primary; when secondary it is, as a rule, an extension from the rectum, uterus, or prostate.

#### NON-MALIGNANT GROWTHS

Are usually villous papillomata, sometimes with a pedunculated, sometimes with a broad base. Fibromata, myomata, and mucous polypi also occur.

*Symptoms*.—In simple growths the chief symptom is hæmaturia occurring spontaneously without pain, and chiefly at the end of micturition. Pain and frequency of micturition are late symptoms. In malignant cases the order is reversed, pain and frequency of micturition usually appearing before the blood, and being throughout prominent symptoms.

Microscopic examination of detached portions of the tumour, the cystoscope, palpation through the abdominal walls, rectal or vaginal examinations are other means of ascertaining the presence of a tumour, and, taken in conjunction with the age of the patient and the history of the case, help to distinguish its nature. Tumours that can be felt from the rectum are usually malignant. As hæmaturia may arise from the kidney, the bladder, the prostate, and the urethra, the condition of each of these organs should be ascertained, and the following points considered before coming to a conclusion as to the source:—1st. Blood from the kidney is uniformly mixed with the urine, and there are no clots. 2nd. Blood from the bladder is usually most abundant towards the end of micturition; the early stream is in many cases comparatively clear. 3rd. Blood from the prostate, especially when due to passive congestion, finds its way back to the bladder. It gives a dark colour to the first urine that passes, and tends also to form clots, which may either escape or may block the passage. 4th. Blood from the penis generally flows independently of the urine.

*Treatment.*—In the case of simple tumours an early exploration of the bladder through a supra-pubic opening, and the removal of the tumour when feasible, is the proper treatment.

In the case of malignant tumours only palliative measures can be adopted, and the chief of these, in advanced cases, is the drainage of the bladder through a perineal or supra-pubic opening.

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### STONE IN THE BLADDER.

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The origin of stone in the bladder is the same as of stone in the kidney (*vide* p. 237). A vesical calculus may have originated in the bladder, in which case it will probably have a nucleus of phosphates, or it may have been of renal origin, with a nucleus of urates or oxalates.

*Physical Characters.*—In the number and size of calculi there is great variety. They have been counted by hundreds in a single case, and have reached a size of nineteen inches in circumference. What is oftenest met with is a single stone one or two inches in diameter, but it is not uncommon to find in an adult two, three, or four.

*Uric acid* calculi are usually fawn-coloured, oval, smooth, brittle, and hard.

*Oxalate of lime* or *mulberry* calculi are of a reddish-brown colour, irregularly round in shape, very rough, and very hard.

*Phosphatic* calculi are whitish-grey, sometimes ovoid, sometimes irregular in shape, chalky and soft in texture.

*Compound* calculi—*i.e.*, calculi in which layers of different substances are met with—are not uncommon. They are the output of constitutional and local conditions, one supplying layers, say, of uric acid; the other, of phosphates.

*Symptoms.*—1st. Pain often reflected to the end of penis. 2nd. Frequency of micturition. 3rd. Hæmorrhage. These

three symptoms are exaggerated by jolting movements, and relieved on the patient lying down. 4th. Sudden stoppage in the flow of urine.

*Sounding the Bladder.*—It is well to put a pillow under patient's buttocks, and to use a hollow sound through which fluid can be injected or allowed to escape. The bladder should contain three or four ounces of fluid. Great gentleness and asepsis should be characteristic of the examination. Every part should be methodically explored, beginning at the neck, and rotating the instrument first to the right and then to the left. It may be well during the examination to let some little fluid escape, and to make the patient stand up. The sound may fail to detect a stone behind the prostate, behind the pubis, in a sacculus, or one covered with muco-pus. It may also mistake a ridge of the bladder encrusted with phosphates for a stone.

A *digital examination* per rectum in children, and per vaginam in women, often gives useful information.

The *cystoscope* helps to clear up many obscure cases.

*Treatment.*—Early removal of the stone by lithotrity, or by lateral, median, or supra-pubic lithotomy. A retained stone not only causes distress, but tends to excite secondary disease of the bladder and kidney. The constitutional conditions that tend to produce stone also require to be remedied, as far as possible, by medicinal treatment.

*Foreign bodies* may reach the bladder through its walls or through the urethra. They usually become encrusted with phosphates, set up the same symptoms, and require the same treatment as calculi.

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# INJURIES AND DISEASES OF THE PROSTATE.

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## INJURIES OF THE PROSTATE

Are seldom met with, and require no special mention.

## ACUTE INFLAMMATION OF THE PROSTATE

Is usually due to gonorrhœa or to septic infection from instruments. The inflammation may engage unequally the gland itself and the cellular tissue round it, and may terminate in suppuration.

*Symptoms.*—There is great irritability of the neck of the bladder, indicated by throbbing pain, tenesmus, painful and frequent micturition. An examination per rectum shows the gland to be tender and swollen, in which state it may obstruct both defæcation and micturition. Suppuration is indicated by rigors and by fluctuation.

*Treatment.*—Hot hip-baths, fomentations, leeches, and saline purgatives, belladonna and morphia suppositories. Retention of urine may require the injection of cocaine and the passage of a catheter, a prostatic silver one if a soft one fails. Both failing, supra-pubic aspiration may be called for. When pus forms it should be liberated, preferably by perineal incision. This should be deep and early. An incision through the rectal wall should be made only on compulsion.

## CHRONIC INFLAMMATION

May be primary from gonorrhœa, or may be secondary to an acute attack. The symptoms differ from those already men-





tioned only in being milder, and may lead one to suspect a vesical calculus or tuberculous disease.

*Treatment.*—Tonics, sea air and sea bathing, cold hip-baths, and cold water enemata, and, in intractable cases, applications of nitrate of silver (gr. 5 to oz.) to the prostatic urethra.

#### PROSTATORRHEA

Is often excited by and occurs during chronic prostatitis. As a simple affection it may be due to masturbation or constipation, or to both combined. In such cases there is a discharge from the urethra, at the end of micturition, of grey, ropy mucus free from pus and spermatozoa.

*Treatment.*—When the causes are no longer in operation the same remedies as in chronic prostatitis will effect a cure.

#### TUBERCULOUS DISEASE

Of the prostate occurs usually as an extension from the testis, bladder, or kidney.

The *symptoms* much resemble those of chronic prostatitis and of vesical calculus. When such symptoms exist, not as a sequel to gonorrhœa, in a patient between twenty and forty, who, on being sounded, is found free from stone, they may be put down to tubercle, especially if there are signs of tubercle elsewhere, or a family history of tubercle. The detection of the specific bacillus in the urine will clear up all doubt.

*Treatment.*—The constitutional treatment of tuberculosis. The less done locally the better, for it is, as a rule, a secondary disease, and direct attempts to remove it are ineffectual, and add to the patient's sufferings.

#### SARCOMA AND CARCINOMA

Of the prostate are rare affections. They are distinguished by the ordinary indications of malignant growths. Removal is impracticable. As in other affections in this neighbourhood, perineal or supra-pubic drainage may give relief in advanced cases.

## GOUTY PROSTATITIS.

Elderly lithæmic subjects are liable to prostatic-vesical irritation, which may extend to the testicle. The treatment should be directed to the constitutional condition.

## PROSTATIC CALCULUS.

Concretions of phosphate of lime occasionally form in the ducts of the prostate gland in elderly subjects. They cause symptoms of prostatic irritation, and can usually be felt on passing a sound and examining per rectum.

*Treatment.*—Removal through a perineal incision, or by means of a lithotrite if they permit of being pushed into the bladder.

## SENILE HYPERTROPHY OF THE PROSTATE]

After fifty, one-third of all males have some enlargement of the prostate, and one-tenth complain of it. It is in some cases a general hypertrophy; in others it is irregular, and tumours form in the substance of the gland, or as pedunculated outgrowths.

*Causes.*—It is probable that the hypertrophy is in some way due to direct or reflex conditions that cause an abnormal vascularity of the part. Anyhow, in many cases its progress is marked by vitiated activities of the sexual apparatus, such as erections from simple turgescence, and in such cases, when these activities are put an end to by the removal of the testicles or resection of the vasa deferentia, this progressive hypertrophy often gives way to atrophy.

*Effects on the Urinary Organs.*—The prostatic urethra is lengthened and displaced, and when the middle lobe is engaged the mouth of the bladder is closed in a valvular fashion. The

prostate is projected into the bladder, which tends to "pouch" posteriorly and, to a lesser extent, anteriorly. The bladder in most cases becomes dilated, its muscular coat is replaced by fibroid tissue, and its expulsive power is lost. If, however, the obstruction is slow in development the walls may become thickened, pouched, and sacculated, as in cases of stricture. For such changes *vide* p. 244.

*Symptoms.*—1st. There is increased frequency of micturition, most marked and first noticed at night. 2nd. The stream is slow in starting, and tends to dribble from the penis. 3rd. After micturition relief is incomplete owing to the bladder not emptying itself fully. 4th. Complete retention is induced if anyhow the patient is forced to hold his water for a long time, or congestion of the prostate occurs. 5th. Attacks of cystitis occur from infection of the residual urine, and are very distressing, owing to the inability of the bladder to empty itself. 6th. Retention may become permanent, so that the urine cannot be voided without the use of a catheter.

*Treatment.*—The patient should be taught to pass a catheter in an aseptic manner, and instructed not to let residual urine accumulate. Jaques's India-rubber catheters, or catheters "elbowed" near the point at an angle to suit the existing condition, are the most suitable. He should avoid chills, alcohol, sedentary habits, and bicycle exercise. Temporary retention should, if every shape of catheter fails to pass, be relieved by aspiration above the pubis. Cystitis should be treated by washing out the bladder, and very obstinate cases by perineal or supra-pubic drainage.

*Radical* cure is aimed at by prostatectomy, preferably supra-pubic, by resection of a portion of each vas deferens, and by castration. Only when distress is great, and relief cannot be otherwise obtained, should such treatment be proposed.

# INJURIES AND DISEASES OF THE SCROTUM, SPERMATIC CORD AND TESTICLE.

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## DISEASES OF THE SCROTUM,

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### EPITHELIOMA.

Chimney sweep's cancer appears as a wart which ulcerates and extends.

*Treatment.*—**Excision.** One need not hesitate to denude the testicle by the operation, as a new covering forms quickly. Enlarged glands must be removed.

The scrotum is also liable to be much swollen from œdema ; hæmatoma ; and erysipelas, sometimes called “inflammatory œdema.” In tropical countries it is subject to elephantiasis.

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## DISEASES OF THE CORD AND TUNICA VAGINALIS.

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### VARICOCELE.

The spermatic veins undergo an enlargement similar to that met with so commonly in the veins of the leg. It occurs usually on the left side, and the following are the reasons given:—1st. A congenital variation which is found oftenest on the left side. 2nd. The greater length of left vein, 3rd. An impediment offered by the angle at which the left vein empties itself into the renal vein. 4th. Pressure of a loaded sigmoid flexure





*Symptoms.*—There is a soft, knobby swelling of the cord, influenced by gravitation. The enlarged veins, as felt through the scrotum, have been likened to worms in a bag. There is feeling of fulness, and sometimes much pain. It is often accompanied by sexual debility and mental depression.

*Treatment.*—Palliative—a suspensory bandage, cold douches and tonics; Radical—excision, and ligature.

### HÆMATOCELE

Of the cord sometimes occurs from the rupture of a varicose vein.

### TORSION OF THE CORD.

Incomplete descent of the testicle predisposes to this accident. There is pain and vomiting and a tumour soon forms in the groin. The condition may be mistaken for one of strangulated hernia, but constipation and other general signs of constriction are wanting. *Treatment.*—Undo the twist by manipulation, if possible; if not, remove the testicle.

### HYDROCELE

Is a collection of fluid in connection with testicle or cord. When the fluid is in the tunica vaginalis, it is the ordinary vaginal hydrocele. When the fluid can be passed back into the general peritoneal cavity owing to the funicular process being unclosed, it is called *congenital*. When the fluid passes up the cord but not into the peritoneal cavity, it is called *infantile*. When the fluid is limited to a point in the cord where the funicular process has remained unclosed, it constitutes *encysted hydrocele of the cord*.

There are two other conditions to which the term hydrocele is applied, but the pathology of which is quite distinct from the foregoing, viz.:—*Diffuse hydrocele of the cord*, which is nothing more than a severe œdema thereof, and *encysted hydrocele of the testicle*, which is a cyst in the body of testicle or epididymis. The fluid in this latter case usually contains spermatozoa, and is situated behind the testicle.

## VAGINAL HYDROCELE.

The effusion is usually chronic. Collects gradually and painlessly, without apparent cause, generally in middle life. It forms a smooth, elastic oval tumour, often constricted by a transverse band. It is translucent, and except in the congenital and infantile form, there is no impulse on coughing. The testicle is behind and below.

*Treatment*.—1. Tapping. 2. Tapping and injecting with iodine. 3. Incision and drainage. 4. Partial excision of the tunica vaginalis.

## HÆMATOCELE.

A hæmorrhage, usually the result of an injury, but sometimes spontaneous, occurs into the tunica vaginalis.

*Symptoms*.—An enlargement which may reach the size of a small cocoa-nut, follows close on the receipt of an injury. It is painless, not translucent, and may, if its history is lost sight of, be confounded with solid tumours. It sometimes suppurates.

*Treatment*.—First try rest position and ice; then tapping. If these fail—antiseptic incisions.

## INJURIES AND DISEASES OF THE TESTICLE.

## ACUTE INFLAMMATION OF THE TESTICLE.

The inflammation may be in the epididymis ("epididymitis"), or in the body of the testicle ("orchitis"), or it may involve both structures. *Causes*.—(1) Extension of inflammation from urethra and prostate; (2) injury; (3) in connection with gout, rheumatism, and certain infective fevers, such as mumps and typhoid fever.

*Symptoms*.—There is a painful enlargement of the part affected. The epididymis may be felt at the back of the testicle as a crescentic mass, or the whole organ may assume a flattened ovoid shape, or in consequence of the inflammation spreading from the epididymis to the tunica vaginalis, there may be a serous





effusion (acute hydrocele) which will cause the parts to become tense, elastic, and pyriform. The scrotal veins are turgid. There is pain, tenderness, and a feeling of weight. After the subsidence of the inflammation, the epididymis often continues hard and nodular.

*Treatment.*—Rest and position; cold by means of Leiter's tubes; or hot fomentations; blood-letting by puncturing veins; an ointment of glycerine and extract of belladonna; and tapping when there is acute hydrocele. When inflammation has subsided, strapping will reduce enlargement.

#### : UNDESCENDED TESTICLE.

A testicle may be delayed or retained at any point in the course of its descent. While so situated it is, of course, liable to the various diseases that affect it when in the scrotum. Hernia very commonly co-exists with a partially descended testis.

*Treatment.*—When the condition gives trouble the testicle and cord may, in some cases, by a careful dissection be liberated from adhesions, transplanted, and the tunica albuginea stitched to base of scrotum. In many cases removal of testicle and closure of the inguinal canal by suture is the best course.

#### SARCOCELES.

Solid, painless enlargements of the testicle, sarcocèles as they used to be called, are due to either simple chronic orchitis, tubercle, syphilis or tumours.

#### SIMPLE CHRONIC ORCHITIS

May persist after acute inflammation, or it may be of gouty origin, or due (in old people) to injury, or to irritation extending from the urinary tract. Other enlargements are often confounded with it.

*Symptoms.*—The testicle is uniformly enlarged, smooth, oval, with flattened sides, and about the size of a goose's egg. There is a little tenderness; slight thickening of cord; a continuance of

testicular sensation; sometimes hydrocele—and, in rare cases, suppuration, with hernia testis.

*Treatment.*—Elevation; strapping; oleate of mercury and belladonna, locally. In hernia testis the edges of the opening may be dissected up, freshened, and made to unite over protrusion, or red oxide of mercury may be sprinkled upon it.

#### TUBERCULAR DISEASES OF THE TESTES.

*Symptoms.*—One or more distinct nodular swellings, appear in the epididymis; later the disease extends to the body of testicle, and softens; the cord becomes also engaged. In many cases the infiltrated epididymis surrounds the testicle as a crescent.

*Treatment.*—Owing to the tendency of the disease to extend along the vas deferens to the vesiculæ seminales and the prostate, and to invade the system generally, early removal of the diseased organ is the best treatment.

*Syphilitic Disease of the Testicle.*—Syphilis attacks the body of the testicle. The epididymis and cord usually escape. As is its habit, it may occur as a general fibroid thickening, giving the testicle the appearance it has in simple chronic orchitis; or as gummata, when the organ will feel hard, irregular, and nodular.

In both varieties hardness, painlessness, and loss of testicular sensation are characteristic, and hydrocele is a usual complication.

*Treatment.*—Support the testicle, and treat for tertiary syphilis.

#### TUMOURS OF THE TESTICLE.

These are chiefly a cystic tumour (variously classified as adenoma, and cystic sarcoma), sarcoma and carcinoma. The first named consists mostly of young connective tissue, which, as it increases, forms retention cysts by the obstruction of the tubes. The presence of cartilage and myxoma often give it very mixed characters. It is, as a rule, encapsuled and non-malignant; does not recur when removed. Sarcoma of the

testicle is usually of the small round-celled variety, and carcinoma of the soft glandular kind.

These tumours all present more or less the same characters. They come on insidiously, are oval in shape, smooth, and firm, and elastic to the touch—sometimes bossy in parts. They are more elastic and fluctuating than are enlargements due to chronic orchitis.

The malignant varieties run the usual malignant course, the lumbar glands enlarging at first, the inguinal after the skin has become engaged. The cord is thickened, but not at first.

*Treatment.*—Early excision.

*Diagnosis of Scrotal Tumours.*—Go fully into history of case. Ascertain by an examination of the inguinal canal whether the tumour has descended from the abdominal cavity. See if it is translucent, if it is reducible, if the cord is engaged, if testicular sensation is affected. Explore for hydrocele, and remove any fluid. After doing so, consider shape and feel of tumour.

Translucency is the most distinguishing mark of hydrocele; rapid development, after injury, of hæmatocele; engagement of cord, and absence of elasticity, of chronic orchitis; nodules in epididymis, of tubercular disease; irregular induration of body of testicle, apparent after tapping hydrocele, of syphilitic disease. The true tumours of testicle all resemble one another in their early stage, before the enlargement of cord and of the lymphatic glands, and engagement of skin, give indications of malignancy. Their elasticity distinguish them from chronic orchitis. The malignant varieties are indistinguishable from one another till subjected to microscopical examination. Testicular sensation is present in chronic orchitis and tubercular disease, and posteriorly in hydrocele and hæmatocele, in other enlargements it rapidly disappears. Tapping gives exit to serum in hydrocele; to a chocolate-coloured fluid in hæmatocele; to a mucoid fluid in cystic disease; to cheesy matter and pus in tubercular disease; to blood in other enlargements.



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